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SOME POSITIVE SCIENCES IN THE VEDAS

Comprising

Book I—The Science of Physics and Chemistry.
Book II—The Science of Mathematics.
Book III—The Science of Medicine.
Book IV—The Science of Cosmology.
Book V—The Science of the Planets.

By
DHARMA DEVA MEHTA
M.A., LL.B., Ph.D.

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Book I

The Science of Physics and Chemistry

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Appendix—*Contributions of Ancient India in the field of Physics and Chemistry.*

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Introduction

There is no human pursuit more thoroughly international in essence and import than the study of science. And though it has become a tradition to believe that science like every other strand of human culture had its origin in the eastern outposts of the Greek confederation, yet to those, who have even a little insight into the vital and prominent role played by the Aryan scientists, the truth of Manu about the cultural heritage of India will need no emphasis. Manu had declared,

एतद्देशप्रसूतस्य सकाशादग्रजन्मनः ।
स्वं स्वं चरित्रं शिक्षेरन् पृथिव्यां सर्वमानवाः ॥

'From a Brahmana born in this country (India), let all men on earth learn their several usages. (Buhler-*The Laws of Manu*). Seen across the centuries, through the scientific explorations, the mighty figures of the vedic scientist, survive our scrutiny.

The Apparatus Behind the Ancient Scientific Researches.

In appreciating the contribution made by these scientists, keeping in view all the wonderous technique of modern apparatus, let us not lose sight of what Prof. Beveridge said on the art of scientific investigation, viz. "Elaborate apparatus play an important part in the science of today, but I sometimes wonder if we are not inclined to forget that the most important instrument in research must always be the mind of man."

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And with the Vedic sages, it is the enrichment of that effulgent vision of the Mind, which was completely in unison with the universal Mind, that awakening of the ऋतम्भरा प्रज्ञा (Purest Intellect), that was, the greatest apparatus in their scientific discoveries.

Prof. E. Bright Wilson, Professor of Chemistry, Harvard University, deplores this lack of *inborn wisdom* in modern scientific researches when he states, in his preface to *An Introduction to Scientific Research* (1952 edition), "Few readers of this preface will need to be convinced of the enormous importance of Scientific research in our present day civilization or of the magnitude of the efforts which is being expended in this activity.

Any one who has tried to do research also knows that it is, in general, a highly inefficient endeavour. An exploration into the unknown, cannot be planned in advance, with precision of a mass-production process. Nevertheless some investigators are far more effective than others and make fewer wrong decisions at the innumerable crossroads which are reached daily during the course of a typical research problem.

We have no way of acquiring the inborn wisdom which is mostly responsible for their success, but perhaps there are a few techniques which we can learn from them."

The Ancient Aryan Scientists :—The *Narada Samhita* makes us familiar with the eighteen earliest scientists of India, whose contributions in the field of Physics, Chemistry, Astronomy, Mathematics etc. etc. mark the summit and perfection of modern science. Those names are :

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ब्रह्माचार्यो वसिष्ठोऽत्रिर्मनुः पौलस्त्यलोमशौ
मरीचिरंगिरा व्यासो नारदः शौनको भृगुः ।
च्यवनो यवनो गर्गः कश्यपश्च पराशरः
अष्टादशैते गंभीराः ज्योतिः शास्त्र प्रवर्तकाः ॥

1.	ब्रह्मा	(Brahma)	10.	व्यास	(Vyasa)
2.	सूर्य	(Surya)	11.	नारद	(Narada)
3.	वसिष्ठ	(Vasishtha)	12.	शौनक	(Shaunaka)
4.	अत्रि	(Atri)	13.	भृगु	(Bhrigu)
5.	मनु	(Manu)	14.	च्यवन	(Chyavana)
6.	पौलस्त्य	(Paulastya)	15.	यवन	(Yavana)
7.	लोमश	(Lomasha)	16.	गर्ग	(Garga)
8.	मरीचि	(Marichi)	17.	कश्यप	(Kashyapa)
9.	अङ्गिरा	(Angira)	18.	पराशर	(Parashara)

Contributions of the Ancient Aryan Scientists.

These Scientist-Preceptors made great contributions and to evaluate their researches in the words of Dr. Seal, "The Astronomy and Mathematics were not less advanced than those of Tycho Brahe, Carden and Fermat; Astronomy was equal to that of Vesalius, the Hindu logic and methodology more advacned than that of Ramus, and equal on the whole to Bacon's ; the Physico-chemical theories as to combustion, heat, chemical affinity, clearer, more rational and more original than those of Von Helmont or Stahl; and the Grammar whether of Sanskrit, or Prakrit, the most scientific and comprehensive in the world before Popp, Rask and Grimm."

(b) According to Goldstucker, "The most scientific

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grammar that the world has ever produced with its alphabet based on thoroughly phonetic principles was composed in India about the 7th or 8th century B.C. (*Panini-His Place in Sanskrit Literature*).

(c) Prof. Macdonell's tribute is significant : "We Europeans.....2500 years later and in a scientific age, still employ an alphabet which is not only inadequate to represent all the sounds of our language, but even preserves the random order in which vowels and consonants are jumbled up as they were, in the Greek adaptation of the primitive semitic arrangement of 3000 years ago."

Prof. Macdonell further observes: "In science, too, the debt of Europe to India has been considerable. There is in the first place, the great fact that the Indians invented the numerical figures used all over the world. The influence which the decimal system of reckoning, dependent on those figures has had, not only on Mathematics but on the progress of civilization in general, can hardly be overestimated. During the eighth and ninth centuries, the Indians became the teachers in arithmetic and algebra of the Arabs, and through them of the nations of the West." (A *History of Sanskrit Literature*, p. 424)

(d) Even in the 9th century B.C., the Greek thought was highly indebted to the scientific knowledge proclaimed by the ancient seers of Bharata, otherwise it could never be called a matter of mere coincidence that in the domain of Science, the two cultures far apart from each other, proclaimed the same fundamental truth. For example, it was Hessiad, the Greek writer.....who wrote that the earth was born first.

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The Scientific Valuation of the Hindu Darshanas.

In the course of our researches into the mechanical, physical, and chemical theories of the ancient Hindus, we come across the remarkable expositions of the *Nyaya Sutras* of Gautama and the *Vaisheshika Darshana* of Kanada, which deal not only with the methodology of science but also elaborately dwell upon the concepts of Mechanics, Physics and Chemistry.

Let it be clearly appreciated at the very outset that the *Samkhya System* deals with the principles of cosmic evolution not merely as a matter of metaphysics, but explains so many concepts of evolution in terms of principles which are known in modern physics as the principles of conservation, transformation and dissipation of Energy and over and above this, the elucidations of pre-atomic states of Matter.

Kapila's Samkhya philosophy dealing with twenty five principles, speaks about the five elements composing Matter.

The Prakriti is, in reality, an undifferentiated manifold, and *indeterminate infinite continuum* of infinitesimal reals, which are the three gunas. These gunas are called *Sattva*, the Essence-a medium for the reflection of intelligence.

Rajas, Energy.

Tamas, Mass or inertia.

Energy has quantum (परिमाण) and extensity (परिच्छिन्नत्व). The nature of energy is to do work and to overcome

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resistance (रजश्चलम् उपष्टम्भकं). Primarily, therefore, all energy in the ancient systems is kinetic.

Kanada, the notable author of the *Vaisheshika system* has given us the Atomic Theory and his exposition of the properties of matter is remarkable. "His theory of the propagation of sound cannot fail to excite our wonder and admiration even at this distant date. No less remarkable in his statement that light and heat are only different forms of the same essential substance."

(P.C. Ray—*History of Hindu Chemistry*, Vol. 1, p, 2)

In Chemistry, inspite of the fact, that laudable work has been done by Western Indologists, on Indian philosophy, mathematics and astronomy and even medicine, the ancient Indian science of chemistry has not received its own share of research and investigation. Wilson's essays in the *Oriental Magazine* as far back as 1823 and J.F. Royle's *Essay on the Antiquity of Hindu Medicine*, the contributions of Jolly and Zimmer have all opened out vast field of researches. yet the science of chemistry, the so called *Rasayana Shastra* has not received much emphasis, probably owing to its technique and complexity.

The *Vaisheshika* and *Samkhya* systems are the earliest documents full of the knowledge on chemistry, exposing as they do, the constitution of Matter and the various hypotheses connected therewith.

Shankara's Disservice to Scientific Exploration :

It is a pity that with the advent of Shankara's *Advaita Theory*, the atomic theory of Kanada and the theory of the twenty-five principles of Kapila, which completely

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encompassed the conception of Modern Physics and Chemistry by the ancient sages dealing with matter, energy, gravity, light, sound, heat, ether, and electricity, the panchabhutas etc. etc. received a great set back and the Indian scholars lost the scientific touch and approach.

In his *History of Hindu Chemistry*, Vol. I, p. 195, P. C. Ray rightly observes :—

"The *Vedanta philosophy* as modified and expanded by Shankara, which teaches the unreality of the material world is also to a large extent responsible for bringing the study of physical science into disrepute. Shankara is unsparing in his strictures on Kanada and his system (*vide* his commentary on II,2,18 on the Vedanta Darshan)."

The Need for Scientific Faculty.

We cannot assess the true sanctity and significance of the researches made by the Vedic seers unless we develop into ourselves their intuitional faculty rather than assume the role of an ill-informed critic. For as Dr. Johnson wrote, "To judge of poets, is only the faculty of poets."

So here with scientists, it is only the genuine, appreciative and scientific outlook that will enable us to admire the stupendous work done by ancient Indian scientists in the vast and varied fields of human activity.

Dharma Deva Mehta

New Delhi,
18th June, 1959.

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CHAPTER I.

The Universe-its Creation and Expansion.

Since the earliest times, the human mind has felt perplexed at the problem of the creation and expansion of the universe and several other aspects relating thereto. Was "this vast Golgotha of the Universe", as Carlyle phrased it, ever created ? The modern scientist objects to the word "creation"—creation out of what ? Is it making something out of nothing ?—a hypothesis which is untenable, for, something cannot be created out of nothing. (नासतो विद्यते भावः)

Scientifically speaking, therefore, there is no such thing as *creation* of the universe—it is manifestation, and we shall understand this fact later, while dwelling upon the story of Existence in the hymn of the *Rigveda* X, 129, the most sublime hymn in the entire vedic revelation.

And the vedic view is in perfect agreement with what Prof. George Gamow observes, that the word "Creation", is not in the sense of making something, out of nothing, but rather as making something shapely out of shapelessness."

(*The Creation of Universe–Preface*)

The original pre-atomic state of Prakriti pervaded the vast space in the beginning of what the vedic seer knows as kalpa, i. e. Brahma's day; it went on assuming multifarious shapes and working till the full span of the

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Day, covered 4,32,00,00,000 years. And we come to Brahma's *Night* of a similar duration, when the process of dissolution starts, returning to the original pre-atomic state—this end of dissolution process being popularly known as the 'Pralaya'.

This is the vedic conception of Pralaya—the eternal evolution and involution of things.

In this context, we are reminded of the oft-quoted saying of Kant, the great scientific philosopher, "Give me matter and I will construct a world out of it." The world did come into existence, out of the pre-atomic state of matter.

The construction proceeded with an order called Satya (सत्य) and a law called the Rita (ऋत), The universal law and order ruled supreme. As the vedic verse proclaims :—

ऋतं च सत्यं चाभीद्धात् तपसोऽध्यजायत
ततो रात्र्यजायत ततः समुद्रोऽर्णवः ॥

Born out of the effulgent Cosmic Sacrifice was the Eternal Law and the Order—then was all dark, then came forth the arnava-ocean, all-enveloping.

The mantra goes on to say :—

समुद्रादर्णवादधि—संवत्सरो अजायत
अहो रात्राणि विदधद्विश्वस्य मिषतो वशी ॥
सूर्याचन्द्रमसौ धाता यथा पूर्वमकल्पयत्
दिवं च पृथिवीं चाऽन्तरिक्षमथो स्वः ॥

(*Rigveda* X, 190)

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From that same billowy flood of Sea, the Samvatsara was produced, ordaining the days and nights, Lord over all, then formed in due order as in the previous kalpa, the Sun and Moon. He formed also the Diva and the Earth, as well as interstellar regions and the region beyond diva i. e. sawaha.

In his famous work, *The Great Secret,* Materlinck rightly asks, "Was it, for example, mere chance that the earth should proceed, take shape and be covered with life precisely in the order which they described ? According to the Laws of Manu, the ether engenders light, the atmosphere; the atmosphere transforming itself engenders light; the atmosphere and light giving rise to heat produce water, and water is the mother of all creatures." (p. 95).

It shows that there was *no chance* in the manifestation process. The entire existence was governed by a definite law and rigid order.

We shall collect vedic evidence and the data given by the modern science on this highly complex structure of the universe and enumerate along therewith, the results of successive stages of differentiation.

The *Hypothesis of Unlimited Complexity* of Modern Science and the Vedic View.

Before studying the process of manifestation of the universe as given in the *Rigveda*, let it be clearly understood that the process is so vast, complex and incomprehensible that it can neither be borne by any personal

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evidence nor can it ever be known, completely, to the highest sage or scientist. Two vedic mantras are worthy of attention in this connection. *Rigveda* X,129,6, emphatically states, 'Who verily knows and who can here declare it, whence it was born and whence came this varied creation? The learned sages were born after this world's production. Who knows then, whence it first came into being ?' (Griffith's translation),

cf. को अद्धा वेद क इह प्रवोचत्
कुत आजाता कुत इयं विसृष्टिः ।
अर्वाग्देवा अस्य विसर्जनेन
आथा को वेद यत आ बभूव ॥

(*Rigveda X,129,6*)

The second mantra viz. *Rigveda* X,129,7, states that the entire mystery of creation is known only to God, or perchance, He also knows not (according to Macdonell and other western scholars).

The mantra runs thus:

इयं विसृष्टिर्यतः आबभूव
यदि वा दधे यदि वा न ।
योऽस्याध्यक्षः परमे व्योमन्त्
सो अङ्ग वेद यदि वा न वेद ॥

He, the first origin of this creation upholds it. He is the supervisor of even the highest heaven, He verily knows it and who knows it, if He also does not know. (or according to Griffith's translation 'He verily knows it or perhaps He knows not.')

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The Nasadiya Sukta of the Rigveda

How did this universe come into being? In the vedas there is nowhere a more comprehensive survey about this question, than in the Nasadiya sukta in the Rigveda tenth mandal and 129th hymn; propounding the process of manifestation and expansion, the famous Nasadiya hymn which is "sublime and unique in its lofty idealism and the most convincing in its advanced logical theory."

It holds that there was the primordial chaos in the beginning, there was neither the Asat (the manifested cosmos) nor the Sat (first stage of matter evolved out of the primordial matter for creation of the universe) nor were there the nebulae, nor the sky beyond them.

नासदासीन्नो सदासीत्तदानीं
नासीद्रजो नो व्योमा परोयत् ॥

And what did then exist? The vedic sage answers: 'There was something which covered all, like a haze-involved in a huge and unbounded collapse. There was no death, nor immortal life, there was no night nor day; God alone Himself breathed, although no wind existed, by His own inherent Might,'

किमावरीवः कुहकस्य शर्मन्
अम्भः किमासीद्गहनं गभीरम् ॥
न मृत्युरासीदमृतं न तर्हि
न रात्र्या अह्न आसीत् प्रकेतः ॥

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आनीदवातं स्वधया तदेकं
तस्माद्धान्यन्न परः किं चनास ॥

There was darkness in the beginning, all this was concealed in darkness, and there was undiscriminated chaos.

तम आसीत्तमसा गूढमग्रे
अप्रकेतं सलिलं सर्वमा इदम् ।
तुच्छयेनाभ्वपिहितं यदासीत्
तपसस्तन्महिनाजायतैकम् ॥

(*Rigveda X, 129,3*)

Prof. Macdonell gives a beautiful poetic rendering of this hymn which we have given in appendix "B".

In this connection, we cannot forget the "*Hypothesis of Unlimited Complexity*" which the Swedish astronomer V. Charlier brought out as a result of his observation on galaxies. Charlier suggested, "that just as the multitude of stars surrounding our sun, belongs to a single cloud known as our galaxy, galaxies themselves, form a much larger cloud, only a small part of which falls within the range of our telescopes. This implies that if we go farther and farther into space, we would finally encounter a space beyond galaxies. However, this super giant galaxy of galaxies is not the only one in the universe, and much farther in space, other similar systems can be found. In their turn, these galaxies of galaxies cluster in still larger units *ad infinitem*. In-

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triguing as it is, this picture of an ever increasing aggregation of mater is unfortunately outside the possibility of observational study."

Truly, did the vedic sage exclaim !

सो अङ्ग वेद यदि वा न वेद

It is He alone who can know all this. Man with his meagre intellect cannot comprehend this.

How Modern Science Looks at this Process of Existence :—

Concluding his masterly thesis, on the creation of the universe, Prof. George Gamow observes," In the dim pre-galactic past, we perceive a glimpse of a metaphysical "*St.* Augustine's Era" (since it was St. Augustine of Hippo who referring to the pre-squeeze era, first raised the question as to "what God was doing before He made heaven and earth"), when the universe, whatever it was made of, was involved in a gigantic collapse. Of course, we have no information about that era, which could have last from the minus infinity of time to about three billion years ago, since all archaelogical records pertaining to that distant past must have been completely obliterated, when the Cosmic masses were squeezed into a pulp. The masses of the universe must have emerged from the Big Squeeze in a completely broken-up state forming the primordial ylem of neutrons, protons and electrons. As the ylem cooled rapidly through expansion, these elementary particles began to stick to one another, forming aggregates of different complexities which were the prototypes of the atomic nuclei of to-day."

(*The Creation of the Universe*, p. 137)

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The earliest "cosmic mass" in the vedic terminology is known as अप्रकेतं सलिलम् (*Rigveda* X, 129,3) which is almost the same as "primeval atom"-a highly compressed, extremely rarefied and completely homogeneous state, whence the universe started its evolutionary process, in the words of the Belgian astronomer, George Lemaitre. Modern physicists are inclined to introduce a better term as "primeval nucleus."

It may be appreciated that the word सलिलम् is not "water" as is popularly understood, and translated, but has a technical meaning, in the vedic terminology, a close resemblance to the 'primeval nucleus' of modern science, in which the ordinary matter did not count and the primary role was played by "intensely hot radiations".

The Steady-State Uuiverse and the Vedic View.

In the field of stellar evolution, the scientists are divided in their opinions. One group believes in a "continuous evolutionary process", which has resulted in the present state of the universe. The other believes in a "steady-state universe", the same state existing since eternity.

The vedic view conforms to the former opinion. The universe started with a pre-atomic state of squeeze and compression which expanded and which will go on expanding for more than two billion years, when the contraction process will start with the '*Brahma's Night*'.

The Dutch astronomer De Sitter also observes:

"Our universe sphere having started with a comparatively small radius has gradually expanded and this

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expansion will continue some thousands of millions of years still and then an opposite process will intervene and the universe will begin to contract and go on contracting and this alternation or succession of expansion and contraction will continue for immeasurable ages."

(Prof. Kanga, *Where Theosophy and Science Meet* Vol. I, p. 46)

Age of the Universe

Let us take up this question in Prof. Gamow's own words and try to reconcile the scientific view with that already given in the vedas. Prof. Gamow asks," How old are the atoms that form the material from which the universe is built ?" According to the vedic view, they are about 1,97,70,00,000 years old and this calculation corresponds remarkably to the view of the modern science according to which "the universe began to expand two billion years ago."

(*The Universe and Dr. Einstein* p. 115)

(a) According to Prof. Gamow," *Astronomical evidence* clearly indicates that the multitude of stars we see in the sky-our own Sun among them-could not have existed eternally and were probably formed earlier than some two billion years ago from the hot primordial gas that previously filled all the universe."

(*Biography of the Earth*, p. 2)

(b) *Geological evidence* leads us to the same conclusion. A method which is known as the radio-active clock method is applied by the geologists to arrive at the age of the rocks that form the crust of our globe. And

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according to that method, the oldest mineral, uranite, leads us to the view that the crust of the earth is at least two billion years old.

(c) From the evidence yielded by the *Oceanic Waters*, the estimated age of our oceans is a few billion years. More than two centuries ago, Edmund Halley, with whose name is attached the remarkable predications of the periodicity of comets, based his observations on the salinity of ocean water, which is 3%, and for this accumulation the scientist believes that the rivers must have been at work for about 300 million years."

(d) Calculating the age from the *Stellar Resources*, by making use of the relation between stellar masses and stellar life spans, we are led to the conclusion that most of the stars forming the milky way system were born about three billion years ago. The stellar system is believed to have existed between two billion and five billion years.

Prof. Gamow, remarkably, sums up the conclusions of the scientists in different spheres of researches on the age of the universe, in these words, "Thus we see that whenever we enquire about the age of some particular part or property of the universe, we always get the same approximate answer : A few billion years old."

"It is true that the answers differ in respect to the exact number of billions, but they all agree as to the general order of magnitude. Thus it seems that we must reject the idea of a permanent unchangeable universe and must assume that the basic features which characterize the universe as we know it to-day are the direct

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result of some evolutionary development which must have begun a few billion years ago."

(*The Creation of the Universe*, p. 20)

The Hindu Calculations on the Age of the Universe :—

It will be interesting to study the mode, based on astronomical evidences, adopted by the Hindu sages, to arrive at the age of the Universe, which is remarkably close to the age independently arrived at by modern science. According to this calculation, our creation (more accurately Expansion/Contraction process) consists of 14 Manus. One Manu is 71 chaturyuga, which means 43,20,000 years as under :—

Golden age	17,28,000 years
Silver age	12,96,000 years
Copper age	8,64,000 years
Iron age	4,32,000 years

71 Manus = 43,20,000 × 71
= 30,67,20,000 years.

At the present stage of expansion, we are in the seventh Manu, called the Vaivasvata (वैवस्वत मनुः)

∴ the years past = 30,67,20,000 × 6
= 1,84,03,20,000 years

and the present is the 28th cycle (out of the total of 71) of the chaturyugi i.e. 4976 years of the iron age have passed and the remaining is 4,27,024 years

Total past = 12,75,23,976 years

and of the 7th deluge, 17,61,87,024 years yet remain.

∴ Age of the Creation is 1,96,08,52,076, i.e. about 2 billion years.

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All this calculation is based on the astronomical motions of stars and galaxies which requires a further study of ancient texts.

The Static Spherical Universe of Einstein.

Einstein believed in a spherical universe which is static and provides neither for expansion nor for contraction.

(b) The vedic view is different. According to the *Yajurveda* XL, 1, the universe is not static-it is expanding and contracting and is continuously in motion.

ईशावास्यमिदं सर्वं यत्किञ्च जगत्यां जगत् ॥

(c) **Russian Mathematician in support of Veda**—In 1920, a Russian Mathematician, Alexander Friedmann, pointed out an error in Einstein's calculations in arriving at a static universe and the error lay in the fact that Einstein divided both sides of an equation by a quantity which may become zero, and division by zero is not permissible in algebraic calculations and the Russian scientist came to the conclusion, that the "correct treatment of Einstein's basic equations leads to a class of expanding and contracting universes."

Friedmann's work was followed by Hubble's discoveries at the Mount Wilson observatory and the theory of expanding universe was finally developed and amplified by the Belgian astronomer Lemaitre, in modern times.

The Elastic Rebound

Modern science believes that "the Big Squeeze which took place in the early history of our universe was the

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result of a collapse which took place at a still earlier era and that the present expansion is simply an elastic rebound which started as soon as the maximum squeezing density was reached." (Prof. George Gamow—*The Creation of the Universe*, p. 29).

How wonderfully the conclusions of the modern science conform to the obesrvation of the vedic sages, will be appreciated by the following mantra of the Rigveda.

ओ३म् सूर्याचन्द्रमसौ धाता यथापूर्वमकल्पयत्
दिवं च पृथिवीं चान्तरिक्षमथो स्वः ॥

(*Rigveda* X, 190,3)

As before (in the previous Kalpa-era), the Creator created the Sun and the Moon—the heaven, the earth, and the firmament etc.—pointing out to the rebound of the evolutionary process, kalpa after kalpa.

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CHAPTER II

The Interstellar Space and the Cosmic Rays

According to Einstein, "the universe is a restless place, stars, nebulae, galaxies and all the vast gravitational systems of outer space are incessantly in motion."

(*The Universe and Dr. Einstein* p. 50)

In the light of the above statement of science on the interstellar space, we shall examine the vedic views on Space in the following pages :—

(1) The Vayu-group of Cosmic Rays

According to the vedic view, the primary place in space is allotted to vayu, which is the chief element pervading it.

(a) This vayu has a lustre. वायुर् अन्तरिक्षे दीप्यते

(*Jaimini Brahmana* I. 192)

In *Yajurveda* I. 24, वायुरसि तिग्मतेजाः the same idea is expressed, *viz.* thou art Vayu, having penetrating lustre.

(b) According to *Shatapatha Brahmana*, this vayu is born of Agni and it is due to Agni that vayu gives lustre. Compare what Yajnavalkya says: प्राणेन वा ऽग्निर्दीप्यते । अग्निना वायुः । वायुना आदित्यः ... ...

(*Shatapatha Brahmana* X, 6, 2, 11)

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(c) The same *Brahmana* further testifies that the solar systems and the galaxies of stars move, as if in a string, woven by this vayu.

तदसावादित्य इमान् लोकान् सूत्रे समावयते तद् यत् तत् सूत्रं वायुः सः ॥

(*Shatapatha Br.* VIII 7, 3, 10)

(2) Heat waves called 'Vayansi'

वयांसि In popular language, this word means पक्षी birds, but in scientific connotation, this word which is often used in the vedas, denotes the interstellar birds or *heat waves* also, in the space. In *Taittiriya-Samhita* V.7,6, we read वयो वा अग्निः 'वयः is indeed Agni (heat).'

(a) In *Rigveda* X, 140, 1, we have a reference to these shining heat waves.

अग्ने तव श्रवो वयो महि भ्राजन्ते
अर्चयो विभावसो ।

"Agni ! thou rich in wealth of beams ! thy fires (called श्रवः and वयः) blaze mightily."

and also in *Yajurveda* XII. 106

अग्ने तव श्रवो वयो महि भ्राजन्ते ।

The smoke in space is the श्रवः and the वयः, as the *Shatapatha Brahmana* clarifies in the explanation of this mantra.

धूमो वा अस्य (अग्नेः) श्रवो वयः

(*Shatapatha Brah.* VII. 3, 1, 29)

(b) It is interesting to note that heat became immortal, and had a lasting moving effect, only on

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account of these वयांसि, the heat waves. Previously, there was no electric effect in heat, this is why it is said that मर्त्या ह वाऽग्ने देवा आसुः and Agni became immortal as an effect of these heat-particles called वयांसि
The *Rigveda* confirms it in the mantra

अग्निः अमृतोऽभवद् वयोभिः ।

(*Rigveda,* X. 45, 8)

The state of mortality to which the *Shatapatha Brahmana* has referred, is the state of instability of these planets. In the expansion of the universe, as soon as these heat-waves affected and pervaded the space, the sun became effulgent, and the moon too started shedding light on earth-there was motion, and there was stability.

In modern science, this law is known as *the law of mutual stabiliiy,* which is due to these heat-waves.

(c) These heat-waves have their own characteristic motion, and according to the *Rigveda* V. 59, 7, they move in group-fields.

वयो न ये श्रेणीः पप्तुः ।

In the cosmic expansion-from आपः to अग्निः, to वायुः whence we are discussing वयांसि, the heat waves, we further observe that as an effect of these heat waves which emit light, the earth shines at night.

The *Rigveda* I. 136, 3 refers to this lightening of earth at night in

ज्योतिष्मती अदितिंम धारयत् क्षितिम् ।

and the *Taittiriya Samhita* V. 6, 4, confirms this, stating

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सर्वा ह वा इयं वयोभ्यो नक्तं दृशे दीप्यते
तस्मादिमां वयांसि नक्तं नाध्यास्ते ॥

This earth appears shining at night, to the terrestrial birds and it is why these birds do not rest on the ground at night time.

(3) The Marichi-group of Cosmic Rays

Then we come to the rays called मरीचय : In modern-science, these मरीचय : are called *auroras* and they are due to corpuscles from the sun which are due to the cyclic motion of the Maruts. 'They take so many forms—beams of light or glowing arches, stable or changing patterns, long drapes or narrow strips of pulsating light, coloured flames or white sheets.' (Prof. Karl Kiepenheuer-*The Sun*-p. 154)

(a) Like vayu, these are also born out of heat (Agni) and hence emit heat and light. The *Jaimini Brahmana* confirms it thus : मरीचयो विस्फुलिङ्गाः

(I. 45)

(b) There are 49 such cosmic rays rotating in different fields and giving rise to different shapes, but it is only the rays called मरीचयः that are most uniform and shining in their movement. This is why, Lord Krishna gives special importance to them in the *Bhagavad Gita* chapter X verse 21, wherein he describes His Excellences :

मरीचिः मरुताम् अस्मि

of the Maruts, I am Marichi,

(c) The vedas hold that these 49 rays move in groups.

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cf. *Rigveda* V. 53, 10 गणं मारुतम्
Yajurveda XXXIII. 45 मारुतं गणम्
Yajurveda VII, 37, सगणो मरुद्भिः

(d) These rays possess electric charges and are called वातत्विषः in *Rigveda* V. 57, 4 and are similar in effect to the solar rays. Thus *Rigveda* V. 55, 3 calls them

सूर्यस्येव रश्मयः

They move in the electric fields, and pointing out this electricity in these maruts, the sage addresses them as विद्युन्मद्भिर्मरुतः while expounding the Rigvedic hymn.

(e) A synonymn for मरीचयः is वातरश्मयः We read in *Matsya Purana* the following version.

तस्मात् सर्वेण दृश्यन्ते व्योम्नि देवगणास्तु ते
यावत्यश्चैव तारास्तु तावन्तो वातरश्मयः ॥

The particular type of rays belonging to the sun is called मरीचिपा.

cf. आदित्यस्य वै रश्मयो देवा मरीचिपाः ॥

These sun-rays protect the मरीचयः (or वातरश्मयः)

(f) These मरीचयः are also called अप्सरा, for which the popular translation is 'nymph'. In *Yajurveda* XV111.38, we have a mention of these, अप्सरसः and commenting on that mantra, the *Shatapatha Brahmana* (I. 88, 1) observes,

आ विद्युन्मद्भिर्मरुतः स्वर्कैः
रथेभिर्यात ऋष्टिमद्भिरश्वपर्णैः ।

(g) The god-Rudra is the god of electricity and is the father of these types of rays called मरुतः. He is called

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पितमरुतां in *Rigveda* II. 33, 1, and in *Rigveda* I. 85, 1, it is interesting to note, these maruts are called the offspring of Rudra. रुद्रस्य सूनवः

There are other qualifying names given to maruts, according to their characteristic features. For example, *Yajurveda* III. 44 calls them रिशादसः-they eat up (burn up) the dead particles.

(4) The Pashu (animal) Group of Cosmic Rays

What are *Animals* in space ? These are the types of cosmic rays which revolve in a field in the form of a quadruped and they are types of heat and electric currents in space. As *Jaimini Brahmana* holds. आग्नेयश्च मारुतश्च पशुः

(II. 231)

These are the 'dust-and-storm types,' says the *Rigveda* I. 22,17

समूढमस्य पांसुरे ।

(a) They contain heat. This fact is corroborated by *Shatapatha Brahmana* VI. 2, 1, 4.

प्रजापतिः तेषु पशुषु एतम् अग्निम् अपश्यत्
तस्माद्वै वैते पशवः ।

The *Taittiriya Brahmana* holds:

आग्नेयाः पशवः ।

(तै० ब्रा० I. 1, 4, 3)

The *Shatapatha Brahmana* VI. 1, 4, 12, clarifies the heat-component of these types of cosmic rays.

सर्वे पशवो यदग्निः । तस्मादग्नौ पशवो रमन्ते ।

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(b) That these apparent animals in space are no other than maruts is, indisputably, confirmed by *Aitareya Brahmana* III. 19 when it holds that पशवो वै मरुतः

and *Shatapatha Brahmana* IX. 3, 3, 7 connects these with वयांसि also, the type of waves about which we have written before at length.

The *Rigveda* X, 90 also connects them with vayu, setting the scientific observer to decide what can be those etherial animals.

cf. पशून्स्तांश्चक्रे वायव्यान्

These rays also emit light.

(c) *Shapes of These "Animals" in Space*

The *Jaimini Brahmana* III. 318 holds that there are eight shapes of these animals moving in space. अष्टातयान् पशून् Out of these the horse-form and the bull-form are very distinctly visible, moving in the Sagittarius and Taurus signs of the zodiac in astronomy. In *Rigveda* II. 33, 6 and 8 we have the bull-type referred to :—

वृषभो मरुत्वान् । प्रबभ्रवे वृषभाय श्वितीचे ॥

And in another text we have

आकाशसम्भवैरश्वैः

—the horses born out of space.

Surely, one who is ignorant of this scientific terminology in the vedas will stumble at this meaning of अश्व as horse. These horses are the *Cosmic Rays* with an electric field of the shape of a horse.

(d) What is the cause of these different shapes ? It is the intermixture of the atoms in आपः, अग्निः and वायुः etc. etc., in the atmosphere. The *Jaimini Brahmana* affirms this in II, 99

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ऊनातिरिक्तो मिथुनौ प्रजननी ऊनम् अन्यस्य
अतिरिक्तम् अन्यस्य। ऊनातिरिक्ताद् वै
मिथुनात् प्रजा पशवः प्रजायन्ते ॥

The laws of pressure (सम्पीडन) and friction in the atoms are responsible for these variations. But inspite of these variations there is a uniformity of motion and affinity of class. This fact is elucidated by *Shatapatha Brahmana* in VI. 3, 1, 22.

तस्माद्‌ु हैतत् पशुः स्वाय रुपाय आविर्भवतीति
गौर्वा गवे अश्वो वाश्वाय। पुरुषो वा पुरुषाय ॥

The cow form follows the cow-form, the horse-horse, the man type follows the man type.

(*e*) *Colours of the Animal-type Rays*

The colour of a majority of these rays is red एतद्वै पशूनां भूयिष्ठं रुपं यद् रोहितम्

(*Tandya Brahmana* XVI. 6, 2)

(5) The Periodicity of the Cosmic Rays

Prof. J. G. Wilson holds:

"smaller storms, on the other hand, have a less well-defined pattern during a given disturbance period, but such disturbances have a tendency to recur with a 27-day periodicity, this being connected presumably with the rotation of the sun."

(*Progress in Elementary Particle* and *Cosmic Ray Physics* Vol. IV, p. 390, 1958)

We have a reference to this periodicity in the *Atharvaveda* XIX. 7 which refers to the 27 nakshatras as a

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luni-solar concept of time. Each nakshatra brings out a relation between the rotations of the sun and the moon. The time taken by the Sun to complete one revolution round the zodiac is 365.25 days. Time taken by Moon to complete one revolution round the zodiac is 27.32 days.

$$\therefore \frac{\text{Time of sun}}{\text{Time of moon}} = \frac{365.25}{27.32} = 13^{\circ}.20'$$

This means that while the sun completes one revolution, the moon completes 13 1/3 revolutions approximately. Taking such an arc of 13°.20′, the whole zodiac is divided into 27 divisions which are called *nakshatras*. Out of the four types of months referred to in Hindu astronomy there is one type known as the Nakshatra-month. This has a duration of 27 days and the cosmic particles revolve in space with this 27-day periodicity.

The *Atharvaveda* XIX, 8, 1, referring to these Nakshatras read thus :

यानि नक्षत्राणि दिव्यन्तरिक्षे
अप्सु भूमौ यानि नगेषु दिक्षु ।
प्रकल्पयंश्चन्द्रमा यान्येति
सर्वाणि ममैतानि शिवानि सन्तु ॥

'Benign to me all those mansions to which the moon as she moves on doth honour—all that are in the sky, the air, the waters, on earth, or mountains, in the heavenly regions' (Griffith).

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CHAPTER III.

Inhabitants in Space

1. The Galaxies in Space

Through the largest (200 inch) reflecting telescope on Mount Palomar in California we can look at space upto 2,00,00,00,00,000 (11 zeroes) light years away. This space is almost uniformly populated with about 26,00,00,000 galaxies. These galaxies are about 20,00,00,000 light years away from us. Each galaxy is made up of at least 10,00,00,00,000 (10 zeroes) stars.

Prof. George Gamow observes :

"The total number of stars in our galactic system including the most distant and faint ones, is estimated by the Dutch astronomer Kapteyn to whom we owe the most careful study of the milky way, to be about 40 billions."

(*The Birth and Death of the Sun*-p. 183)

(2) The Vedic Calculations :—

These galaxies adorn the stellar space.

About the decoration of the firmament by the gods, the *Rigveda* also holds

अमि·····नक्षत्रेभिः पितरो द्याम् अपिंशन्

About the number of these galaxies which adorn the firmament, we have a calculation in the *Shatapatha Brahmana* in X. 4, 4 the text of which reads thus :

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प्रजापतिं वै प्रजाः सृजमानम् ।
पाप्मा मृत्युरभिपरिजघान् स तपोऽतप्यत ।
सहस्र संवसरान् पाप्मानं विजिहासन् ।
तस्य तवस्तेवमानस्य एभ्यो लोमगर्तेभ्य
ऊर्ध्वानि ज्योतींष्यायन ।
तद्यानि तानि ज्योतींषि एतानि तानि नक्षत्राणि ।
यावन्त्येतानि नक्षत्राणि तावन्तो लोकगर्ताः ।
यावन्तो लोमगर्ताः तावन्तः सहस्रसंवत्सरस्य मुहूर्ताः ॥

According to this the no. of stars in our galaxy comes to 1,08,00,000.

Adverting to this calculation and the difference that we find in the observation of modern science, Prof. Bhagavad Datta, an eminent Vedic scholar, is inclined to believe that the calculation of the vedic seers went as far as the *Dyu-loka*, though the modern science has taken into account the galaxies existing in the farther regions also. He says.

> 'यह नक्षत्र अथवा तारा गणना हमारे द्युलोक तक है पाश्चात्य ज्योतिषियों ने द्युलोक तथा उससे अगले लोकों के ताराओं की गणना भी की है ।
>
> (वेद विद्या निदर्शन p. 284)

What are these stars ? According to *Taittiriya Brahmana* these were bubbles in the आपः caused in the earliest stages of cosmic expansion, which later turned into stars.

सलिलं वा इदमन्तरासीत्
यदतरन् तत्तारकाणां तारकत्वम्

(*Taittiriya Brahmana* 1, 5, 2, 5)

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II The Marut Group of Cosmic Rays

The Maruts are referred to in the vedas as :

भ्राजत् ऋष्टयः (*Rigveda* I, 31, 1) shining ones

रुक्म-वक्षसः (*Rigveda* II, 34, 2) with their chests (fields) shining like gold.

हिरण्य-शिप्राः (*Rigveda* II, 34, 3) etc. etc.

(1) These Maruts Possess Magnetism

The *Rigveda* refers to this magnetic power in these Maruts by calling them अयोद'ष्ट्र in I, 88, 5 and all electro-magnetism in space is due to these Maruts.

Modern science believes that there is always a magnetic field enveloping a current of electricity and in certain conditions magnetic fields also induce electric currents.

The term electro-magnetic field which is responsible for propagation of light waves, radio waves etc. in space, is well known in modern Physics.

(2) Direction of the Electromagnetic Field Created by Maruts.

In *Rigveda* I, 87, 4, we have an indication of the electro-magnetic field in which the Maruts move. The 87th hymn is the Marut hymn and the Maruts have been called ईशानः therein i. e. pointing to the North-east. The *Rigveda* I, 64, 5, calls the Maruts as ईशान-कृत
We have a confirmation of this direction in *Jaimini-Brahmana* III. 381, which says

ततो मरुतो ऽसृजत-ईशानं मुखान् ।

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(3) The Colour of the Marut-rays

The vedic literature takes it as white. All rays with the direction towards north-east have a silvery white colour. The *Shatapatha Brahmana* holds this view in XIII, 2, 10, 3 and the same view is held by *Jaimini Brahmana* in III, 382

तमस्याम् ऊर्ध्वायां दिशि मरुतो ऽन्वैच्छन्
ईशानमुखाः । ते ऽन्वन्दिन् यत्
श्वेतं रुपं तत् ॥

There is an allusion to a mythological legend in the *Aitareya Brahmana*, according to which the demons built a "town of silver in space." It is given in I, 23

(असुराः) रजतां पुरीं अन्तरिक्षम् (अकुर्वन्)

—this town of silver is made by the Maruts which possess that colour.

(4) Men-Shaped Maruts.

These Maruts possess electricity and heat. The *Rigveda* I, 45, 14 takes Maruts as अग्निजिह्व

It is interesting to note that sun rays heat and light, while coming in contact with these Maruts, in the cosmic atmosphere. This fact is clearly stated in a hymn of the *Rigveda*, which is addressed to the Sun. The specific mantra I, 50, 5 holds:

प्रत्यङ् देवानां विशः प्रत्यङ् ङुदेषि

O Sun, thou goest to the देवविश् *i.e.* Maruts and thou comest hitherto मानुष (*lit.* mankind). Now what are these

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"men" in the atmosphere. Although, Griffith in a very literal translation has taken it to mean "mankind" yet if we go deep into the scientific connotation of this word, we shall find that the word refers to a class of the 'Maruts' in the atmosphere. And Skanda Svami, the great vedic commentator of the 7th century A. D. rightly and invariably translates it like this:

मनुष्याकारा मरुतः

—the waves of the electro-magnetic field wherein these man-shaped particles work. Another subtle group in interstellar region is known as the ऋभवः in vedic terminology. The *Rigveda* I, 146, 4 refers to "men in the Sun." आविरेभ्यो अभवत् सूर्यो नृन् and again in I,110,6, we have अन्तरिक्षस्य नृभ्यः 'for the men living in' the interstellar region. Surely, these "men" are no other than maruts of the shape of men, with reference to the electro-magnetic field in which they move.

Some of the scholars have not gone very deep into these references and as गौः is every where translated as "cow", giving rise to the gravest error of sanctioning the killing of cows in the vedic hymns,

cf. अघासु हन्यन्ते गावः

so here, Griffith and Macdonell take नर and मानुष to mean "men", because they are not aware of their scientific implication as revealed by the vedic commentator Skanda-Svami, and even his late successor Sayana.

(5) These Maruts Carry Rain.

The Maruts carry rain. The rain water drops down and again goes back upto the Sun, through these Maruts.

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समुद्रात् वायुसंयोगात् वहन्ति आपो
गभस्तयः ।

i. e., the rays of the sun in union with the winds carry water vapour (आपः) from the terrestrial ocean. The Kapishthala Samhita says :—

मरुतः सृष्टां वृष्टिं नयन्ति ।

The *Taittiriya Samhita* also holds thus :—

अग्निर्वा इतो वृष्टिम् उदीरयति ।
मरुतः सृष्टां नयन्ति ।

The Maruts carry rain through the interstellar region. The *Rigveda* V, 55,5, also states the same fact in an address to Maruts, to carry rain upwards from the oceans to the Sun.

उदीरयथा मरुतः समुद्रतो
यूयं वृष्टिं वर्षयथा पुरीषिणः ।

The word पुरीषिणः here refers to the Maruts having a special type of Agni particles in them. There is another reference in the *Rigveda* I, 164, 47, to the same effect, holding that the Maruts carry rains from the ocean to the Sun.

कृष्णं नियानं हरयः सुपर्णा
अपो वसाना दिवमुत्पतन्ति ।
त आववृत्रन् त्सदनाद् ऋतस्य
आदिद् घृतेन पृथिवी व्युद्यते ॥

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In his notes on this mantra, Griffith says : 'the rays of light descend into the darkness of the earth, when wrapped in night and rise again to heaven with the moisture which they have absorbed, to descend again in the form of fertilizing rain.' (*The Hymns of the Rigveda*, p. 227)

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III. The Ribhava-group of Cosmic Rays

(i) The Solar Rays called ऋभवः

(ऋभुः) Ribhu is a ray of the Sun, which is extremely glowing. Yaskacharya confirms this by saying :

ऋभव उरु भान्तीति वा (*Nirukta* XI, 15)

The *Rigveda* I, 110, 4 holds that the Ribhavas are solar rays.

ऋभवः सूरचक्षसः

They had no lustre and were "mortal" as it were, but they became "immortal gods" by getting the solar medium. As *Rigveda* I, 110, 4, affirms:

मर्तासः सन्तो अमृतत्वमानशुः

The entire sukta 110 of the *Rigveda* Mandala I relates to ऋभवः ribhus.

And therein it is certified that the Ribhavas became immortal only through the Sun.

तत् सविता वोऽमृतत्वमासुवत्

Sun is known as thousand-rayed. Ribhavas are one type of solar rays like others e.g. विम्बा and वाज which are frequently mentioned in the vedas.

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IV. The Apsara-group of Cosmic Rays

The so-called Apsaras, literally translated as nymphs of the sky, are also types of cosmic rays—types of the मरीचयः of which we have made a mention herein. In support of this statement, let us examine *Yajurveda* XVIII, 38, which refers to these Apsaras

ऋतावाड् ऋतधामाग्निः
गन्धर्वस्तस्यौषधयोऽप्सरसो मुदो नाम ।

While commenting on this verse, the *Shatapatha Brahmana* states:

सूर्यो गन्धर्वः । तस्य मरीचयोऽप्सरस
आयुवो नाम''''आयुवान-इव हि मरीचयः
प्लवन्ते ॥

(*Shatapatha Brahmana* IX, 4, 1, 8)

Sun is the Gandharva and his rays are the Apsaras. Eggeling translates the word अप्सरसः as *Sun-motes*.

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V. The Dust in Space.

Modern Science conceives of the rarefied *cosmic dust* that floats in the interstellar space. According to Whipple, "these tiny dust particles, barely one fifty-thousandth of an inch in diameter, exist in the space."

According to another expression:

"The space between the stars is far more empty than the best vaccum that can be produced in a laboratory. But it is not utterly void. It is pervaded by an excessively tenuous distribution of interstellar matter partly in the form of *gas* and partly *dust*".

(*The Physics of the Sun aad Stars*-p.8)

(2) The Vedic Equivalent

The dust in space is known as रजः in the vedic connotation. It is a cosmic wind-a stream of protons and electrons. The *Rigveda* X, 121, 5 alludes to this रजः in the mantra-portion.

यो अन्तरिक्षे रजसो विमानः ।

—that Prajapati who created *dust* in the interstellar region. The *Rigveda* X, 129 says that there was no *dust* at the beginning of the creation. (नासीद्रजः). This dust in the interstellar region is distinguished from the dust on the terrestrial sphere which is called पार्थिव रजः. The *Yajurveda* XXXIV, 32 refers to this:

आ रात्रि पार्थिवँ रजः
पितुरप्रायि धामभिः ।

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The *Rigveda* I, 154, 1 also draws this distinction while referring to the earthly dust in

यः पार्थिवानि विममे रजांसि ।

(3) Colour of the Cosmic Dust

In *Rigveda* I, 35, 4 we have a mention of the dark coloured dust. कृष्णा रजांसि

and in *Rigveda* I, 35, 9 the phrase कृष्णेन रजसा has been used. According to Macdonell, it means "dark spaces". But in later literature we have different colours of this dust. For example, the *Parashara Samhita* takes it as red, white and blue etc.

पांशुरजो ऽ रुणप्रभेषु वृष्टिम् । श्वेते
ब्राह्मणपीडाम् । लोहिते शस्त्रकोपम्
नीले शस्त्रक्षयम् ॥

(4) Absence of Dust in the Cosmic Rays

The *Rigveda* I, 168, 4 holds out a possibility where the मरुतः type of the cosmic rays may not have any dust. The mantra refers to अरेणवः मरुतः

According to modern science, "the space immediately near the sun is free of dust since here the dust of the sun evaporates all solid particles."

(Karl Kiepenheauer-*The Sun*. p. 38)

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VI. The Zodiacal Light (दिग्दाह) in Space

(1) What is दिग्दाह ?

This is a technical word meaning "blazing of boundaries" in the vedic literature. The modern science has no exact equivalent for this word, because it has no clear conception of boundaries and directions in space. The nearest phrase given by modern science is *The preternatural redness of the horizon.*

In a Hindu book of Astronomy known as the बार्हस्पत्य ज्योतिष-संहिता we have a mention of this zodiacal light:

सदाऽस्तमित आदित्ये वह्निज्वाला प्रदृश्यते ।
दिशां दाहं तु तं विद्याद् भार्गवस्य वचो यथा ॥

Always at the sunset, there is a blaze of light which is known as दिग्दाह

(2) Zodiacal Light is connected with the Sunset

Let it be clearly understood that the redness which is visible at the time of sunrise is not the दिग्दाह. There is a strange conglomeration of the solar rays with the boundaries at the time of sunset, which produces this phenomenon. In modern science, we do have a scattering of light both at sunrise and sunset. It is believed that "at sunrise and sunset, the light passes a much greater distance through the atmosphere, so that more scattering occurs, the result being, that the sky is a deeper blue while the sun appears red because the blue light is all scattered." As against this, the Hindu sages believed that the scattering of light at sunset, which is called the दिग्दाह was a peculiar effect of the *setting sun's rays* on the boundary rays.

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As Prof. Karl Kiepenheauer clarifies it, "*Shortly after night fall* or just before the dawn, an observer in the shadow of the earth may sometimes witness the striking spectacle of zodiacal light. Zodiacal light is the result of the reflection of sunlight by interplanetary dust and electrons. It looks like a pyramid of light towering up over the horizon and may be as bright as the Milky Way."

(*The Sun*-p. 38)

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VII. Boundaries in Space

Einstein believes that "the universe consists of galaxies of stars and nebulae and that the gravitational systems in outer space are constantly moving.....In space there are no directions and no boundaries."

(*The Universe and Dr. Einstein*, p. 50)

The vedic view is different. The once unstable atmosphere became firm only on account of वयः and मरुतः etc. in which दिशः also play an important role.

(1) The Region of दिशः

The (दिशः) directions comprise, as it were, the fourth world (लोक). That world keeps up the adjustment of galaxies as in a balance. The *Jaimini Brahmana* (II, 179) refers to this fourth region in space as under

एष उ ह वै चतुर्थो लोको यद् दिशः ।

The three regions are भूः, भुवः and स्वः, the fourth is the दिशः

(2) How this Region is Pervaded in Space.

The *Shatapatha Brahmana* holds that this region is stretched between the *Maruts* and *Adityas* like a balance, technically called शिक्यम् (छिक्का in Punjabi distortion).

दिशः शिक्यम् । दिग्भिर्हीमे लोकाः
शक्नुवन्ति स्थातुम् । यच्छक्नुवन्ति
तस्माच्छिक्यम् ॥

(*Shatapatha Brahmana* VI, 7, 1, 61)

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The *Shatapatha Brahmana* VI, 5, 2, 11 states that the worlds were made stable by the gods by means of these *directions* converting them, "like a balance".

एतद् वै देवा इमान् लोकान्
उखां कृत्वा दिग्भिरदृंहन् ।

The meaning of the word शिक्य, according to Sir Monier Williams, is 'the string of a balance'. Eggeling translates it as 'netting'. Yajnavalkya refers to 'two pans' शिक्यद्वयं, and thus the exact meaning of the word implies, two pans which cover the entire motion of the solar systems in the universe.

The *Atharvaveda* XIII, 4, 8, describes its figure and shape as that of a balance. तस्यैव मारुतो गणः स एति शिक्याकृतिः।

(3) These Boundaries have Magnetic Effect

We have several references to the दिक्सूची in the *Brahmanas*. The *Shatapatha Brahmana* XIII, 2, 10, 3 says दिशो वै लोहनय्यः. The *Taittiriya Brahmana* III, 9, 6, 5 holds the same view on the magnetic effect of these boundaries.

cf. दिशो वै अयस्मय्यः (सूच्यः)।

These rays also move in groups छन्दांसि वै दिशः ।
(*Shatapatha Brahmana* VIII, 3, 1. 12),

and they move under the influence of the solar rays.
दिशो वै हरितः (*Jaimini Brahmana* II, 229)

(4) The Magnetic Field of these Boundaries

These rays move in a circular form (छन्द). As *Shatapatha Brahmana* VIII, 5, 2, 3, certifies दिशो वै परिभूः छन्दः The

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Shatapatha Brahmana further holds that the gods converted these boundaries into an elliptical form and thus stabilized the sun and the earth etc.

एतद्वै देवा इमांल्लोकान् उखां कृत्वा
दिग्भिरदंहन् । दिग्भिः पर्यतन्वन् ॥

(*Shatapatha Brahmana* VI, 5, 2, 11)

Speaking scientifically, this stability is due to the electromagnetic field existing around these boundaries.

And this field extends far off, enveloping the entire atmosphere. According to modern scientific investigations, "Although the atmosphere extends, at most, but a few hundred miles upwards, the magnetic field is appreciable upto a distance of 10,000 miles. At 400 miles, the magnetic field's intensity is about one eighth that at the surface."

(*Radioactivity and Nuclear Physics*, p. 286)

The intensity of this field is maximum in the Northern boundaries. This fact is thus stated in the *Brahmana.*

अथैतस्याम् उदीच्यां दिशि भूयिष्ठं विद्योतते ।

These boundary rays are controlled by other rays called आप्य, साध्य, अन्वाध्य and मरुत. The *Shatapatha Brahmana* affirms it in XIII, 4, 2, 16

अथैते दैवाः (आशापालाः) आप्याः, साध्याः,
अन्वाध्याः, मरुतः ।

There are mountains to shield these rays and these mountains are the मरुत's. The *Rigveda* refers to these in 1, 39, 3

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वि याथन वनिनः पृथिव्या वि आशाः
पर्वतानाम् ।

The *Atharvaveda* V, 24, 6 also refers to these mountains and takes them as मरुत's

मरुतः पर्वतानामधिपतयः ।

(5) **The Eight Boundaries and the Yonder Space.**

There are eight boundaries recognised in the Hindu scriptures, as given below:

1. माहेन्द्री Eastern
2. वैश्वानरी East South
3. याम्या Southern
4. वैकृति South East
5. वारुणी Western
6. वायव्या West North
7. कौबेरी Northern
8. ऐशानी North East

(a) These eight directions are covered by solar systems and have nothing to do with the worlds, where there is no solar system. Those worlds are the महः, also called अपराजित and the अधिद्यु:. Those two boundaries, collectively called अतिरिक्त affect these two regions and have no influence on the regions of the solar systems governed by the above eight boundaries. The *Shatapatha Brahmana* VIII, 6, 1, 14 clarifies it thus:

तद् या अमुष्माद् आदित्याद् अर्वाञ्चः पञ्चदिशः ता
नाक्षसदः । याः पराच्यः ता पञ्चचूड़ाः ॥

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Those on this side of the आदित्य–the solar system, are called नाकसद and those on the other side, are called पञ्चचूड़ाः Thus we see that there are in all ten boundaries in space.

(b) Now we have to examine two evidences.

(1) How are these boundaries formed ?

(2) what is the nature of space beyond this solar system ?

The first question is taken up by the Vaisheshika system of Hindu Philosophy and Shankara-Misra, the commentator, writes in his वैशेषिक उपस्कार (*Vaisheshaka Upaskara*) at II, 2, 16

एते चादित्यसंयोगा येन विभुना द्रव्येणोपनीयन्ते सा दिक् इति कणादरहस्ये व्युत्पादितं विस्तरतः ॥

They are born out of the contacts of the pervading particles called विभुः in space and the rays of the sun.

That there is yonder space is referred to by *Jaimini Brahmana* thus:

अथ यत् परेण दिवम् अन्तरिक्षं मन्यन्ते । एवं परेण पृथवीम् आपः तेनो बहिर्निधने–इति

(I, 298)

The *Shatapatha Brahmana* hints at these yonder boundaries in VI, 5, 2, 7 तस्माद् एषां लोकानाम् अन्तरतश्च बाह्यतश्च दिशः that is, there are directions and boundaries beyond (solar system) just as there are boundaries within the solar systems.

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There is a statement in *Jaimini Brahmana* which presupposes clearly the existence of the yonder regions in space. It says in III, 310

तस्माद् अयं वायुः—अस्मिन् अन्तरिक्षे
तिर्यङ् पवते ।

In *this* atmosphere, the vayu blows *vertically* (तिर्यङ्). The very word अस्मिन् presupposes the existence of तस्मिन्, i.e. other atmospheres beyond the effect of solar systems.

In *Genesis* I, 6, we have a statement: And God said, "let there be a firmament in the midst of the waters and let it divide the waters from the waters." The spatial matter called आपः roughly translated as 'the waters' is divided in the अन्तरिक्ष into two regions. And this statement is already available in *Yajurveda* XII, 49

या रोचने परस्तात् सूर्यस्य
याश्चावस्तादुपतिष्ठन्त ऽ आपः ।

(6) The Importance of these Boundaries in Sacrificial Rites of the Hindus.

There is a considerable sanctity attached to these boundaries in the performance of the yajnas. A portion of the *Yajurveda* XI, 58 reads thus : ध्रुवासि दिशोऽसि धारया मयि प्रजां रायस्पोषं गौपत्यम्.....

While commenting on this, the *Shatapatha Brahmana* says :

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दिशो हैतद् यजुः । एतद् वै विश्वे देवा वैश्वानरा एषु लोकेषु उखायाम् एतेन चतुर्थेन यजुषा दिशोऽदधुः ।

(VI, 5, 2, 6)

"The boundaries themselves are the sacrifices-and by the fourth incantation have these gods (the sun-rays) placed these boundaries in this small altar."

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VIII. The Nagas or 'Solar Prominences' in Space

It is believed by ancient Hindu scientists that each main direction has for its support, one Naga.

In *Garga Samhita*, an outstanding work on Hindu Astronomy, we read, that there are 4 *Nagas* that support four directions.

(i) One supporting the East is called वर्धमान

(ii) the other supporting the South is called सुवृद्ध

(iii) the other supporting the West is called अतिवृद्ध

(iv) the other supporting the North is called पृथुश्रवा:

The original text goes thus:

चत्वारः पृथिवीं नागा धारयन्ति चतुर्दिशम्
वर्धमानः सुवृद्धश्च अतिवृद्धः पृथुश्रवाः ॥
वर्धमानो दिशं पूर्वां सुवृद्धो दक्षिणां दिशम्
पश्चिमाम् अतिवृद्धश्च सौम्याशां तु पृथुश्रवाः
नियोगाद् ब्रह्मणो ह्य ते धारयन्ति अम्बुसंस्थिताः ॥
ते वसन्ति सदा श्रान्ताः स वायुं श्वसते महान्
वेगान् महीं चालयते भावाभावनिदर्शकः ॥

In modern science, these nagas are known as the *Solar Prominences* which are called *the Alps of the Sun* in the words of Prof. Karl Kiepenheuer. (*The Sun*-p. 111)

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"Their height may exceed 1,00,000 miles, yet these mountains impressive, though, they look through the telescope are entirely made up of moving gases. They contain very small quantities of matter, the density of a prominence being considerably lower than that of, say a column of smoke.....gigantic luminous "trees" or "funnels" at the *limb*, prominences look like dark snakes when seen against the disc and are then called filaments". (*Ibid.*)

Solar prominences can be observed with the help of the scientific apparatus called the "coronagraph".

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CHAPTER IV

The Sun

What is Sun ?—the *Aditya*--the indestructible source of energy. As the scientist Prof. Karl Kiepenheauer observes, "It is a glowing ball of gas of diameter 8,64,000 miles. It is held together by gravitational forces and its diameter is unlikely to have changed a great deal in billions of years. In all probability, the sun will retain its shape for billions of years to come." (*The Sun*-p.78)

Such is the Sun, the *Aditya*, the सहस्ररश्मिः, which we are going to investigate through the ancient vedic texts, together with Sun's composition, with its hydrogen, coming close to, but not completely synonymous with the *Apah* (आपः) of ancient vedic sciences.

The astronomer's sun differs greatly from the lay man's, for where the latter sees a brilliant disc spreading light, warmth and well-being, the astronomer sees a star, or a hydrogen sphere, with a surface temperature of approximately 10800° F. This sphere does not rotate as a solid body, and its surface is studded with spots, faculae and prominences." (*Ibid.* p. 11)

(2) Creation of the Sun

In the course of cosmic manifestation, *earth* was born first, then came the interstellar regions (अन्तरिक्ष) and after that, was *the sun* created. This is the process of

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creation accepted in the vedas, and later adopted by the Greeks.

About the birth of the Sun, the text of the *Shatapatha Brahmana* VI, 1,2,3, reads thus :

सोऽकामयत । भूय एव स्यात प्रजायेतेति । स वायुना-
ऽन्तरिक्षं मिथुनं समभवत् । तत आण्डं समवर्तत ।
तद् अभ्यमृशद् यशोवृहतीति । ततोऽसावादित्योऽ
सृज्यत । एष वै यशः । यदश्रं संक्षरितमासीत्
सोऽश्मा पृश्निरभवत् । अश्रुर्हं वै
तमश्मा इत्याचक्षते ॥

According to this statement, God said, 'let me be many-then Sun was born out of the union of *vayu* and *antariksha* (space). Sun contains vayu, Apa, and Agni and is also known as अश्मापृश्निः which is its primary content.

What is this अश्मापृश्निः ? The *Rigveda* V, 47, 3, makes it situated in the mid-heaven.

cf. मध्ये दिवः निहितः पृश्निरश्मा
वि चक्रमे रजसस्पात्यन्तौ ॥

This अश्मापृश्निः matter is responsible for electricity in the Sun. The *Shatapatha Brahmana* refers to it as containing विद्युत् eletricity. मध्ये दिव्योनिहितः पृश्निरश्मा, It is only on account of this substance which as the name implies is of variegated colours known as VIBGYOR.

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Again the *Shatapatha Brahmana* confirms this statement, holding

पृश्निर्भवति । रश्मिभिर्हि मण्डलं पृश्निः ॥

The Prajapati said--"rays" and with this word, were the rays created in the Sun, which is called रश्मिः समूह (collection of beams).

The *Taittiriya Brahmana* refers to this in these words

रश्मिः—इत्येव आदित्यम् असृजत् । (तै० सं० V, 3, 6)

(3) **Sun's Atmosphere** (सूर्य मण्डल)

Sun's atmosphere is full of light.

As *Jaimini Brahmana* puts it : असौ वा आदित्यो भा इति (I, 330)

Sun is also called *Samvatsara* (संवत्सर)

असावेव संवत्सरो यो ऽसौ तपति । तस्य यद्भाति तत्संवत् यन्मध्ये कृष्णं मण्डलं तत्सरः ॥

(*ibid.*)

The outer part, which shines, is called संवत् and the black spot in the interior in called सरः. At another place, the same thing is expressed.

अथो आहुः । आदित्य एव संवत्सरः । एतं हि सर्वा श्रीः । सर्वं यशः । सर्वे देवाः समेताः । तस्माद् आदित्य एव संवत्सरः इति । तस्य यद् भाति तत् संवत् । यन्मध्ये

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कृष्णं मण्डलं तत्सरः ॥

The epithet सरः corresponds to the *umbra* of modern physics.

Answering the question, what is a sunspot ?, Prof. Karl Kiepenheuer states that, "each spot consists of a dark nucleus called the umbra and a border called the penumbra. Naturally the umbra is not completely black, and only appears to be so in contrast to the very much brighter background." (*The Sun*-p. 82)

Penumbra is a term synonymous with the vedic संवत् and umbra signifies सरः. The *Jaimini Brahmana* II, 62 calls them day and night अहोरात्रे

cf. अहोरात्रे एव कृष्णाजिनस्य रुपम् । अहरेव शुक्लस्य रुपं रात्रिः कृष्णस्य । अथ यदेतन्मण्डलं ता आपस्तदन्नं तदमृतम् ॥

The rays of the Sun which are in the downward region are like the 'beard' and those in the upward zone are like the 'hair' and the entire surface is like the deer-skin, the अहः is the white; bright form and रात्रिः the dark spot in the interior.

(4) *Eruption Hypothesis* **of Modern Science and Vedic View.**

These sunspots are moving in groups and the number of the visible sunspots is variable. Their periodic motion and rise and fall in their number was previously associated with the motion of the planets, particularly with that of Jupiter, but modern science takes it as depending on purely

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independent processes. This independent process, according to the vedic view is due to the आपः and आग्नेय electrons and neutrons only and has no relation to planetary influences.

The *Chhandogya Upanishad* clearly refers to this process and this process is known as "eruption hypothesis", in Modern Science and on this hypothesis, as Prof. Karl Kiepenheaur observes", "each cycle represents an independent eruption of the Sun which takes about eleven years to die down."

(*The Sun*-p.87)

This eruption process is called क्षोभन in the vedic literature, but the calculation of the eleven year's period is yet a matter for research.

The *Chhandogya Upanishad* III, 1-4 states एतद् आदित्य-मध्ये क्षोभते इव. Another word used by scientists for क्षोभन is *Thermal Agitation*. Making use of this term, Prof. W. H. Mc. Crea writes, in reference to atomic collisions, "In a gas, the atoms, ions and any other particles present are always in a state of thermal agitation, as a result of which they are continually colliding with each other."

(*Physics of the Sun and Stars*, p. 43)

(5) The Matter Composing the Sun.

The sun contains as its substances the आपः, वायुः and अग्निः etc.

What is आपः in the terminology of modern science ? It is closely akin to hydrogen, although the आपः virtually is hydrogen plus something more. Of all the elements that

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compose the sun, the hydrogen element is of the maximum percentage and it is the transmutation of hydrogen into helium that supplies energy to the Sun. There is another substance called *corona* which, according to mathematical calculation accounts for only $_{10}^{-15}$ of the sun's total mass. This corona is believed to be composed of interplanetary matter, that is to say, dust and meteors. There is a constant gravitational pull of matter into the corona.

Talking about the hydrogen contents of the Sun, Prof. Mc.Crea observes,

"One set of estimates puts the hydrogen content at about 80 percent, by numbers of atoms, the helium at about 20 percent and the heavier elements at about one percent. Another puts the hydrogen at nearly 100 percent, the helium at about one per cent and the heavier elements at something very much less than one percent."

(*Physics of the Sun and Stars*, p. 105)

The following references from the vedas will show that the Sun contains आप:

(i) *Yajurveda* XIII, 30, clearly refers to this

अपो गम्भन्तसीद मा त्वा सूर्योऽभिताप्सीत् ।

Commenting on this mantra, the *Shatapatha Brahmana* says

एतद् ह अपां गम्भिष्ठं एतत् तपति ।

(VII, 5, 1, 8)

Certainly, the Sun is the deepest seat for heavenly *apah*.

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(ii) The *Jaimini Brahmana* II, 62 holds the same view in अथ यद् एतन्मण्डलं ता आपः and the same *Brahmana* further clarifies in II, 145 as under :—

ये ह वा एत आदित्यस्य रश्मय एतानि ह वा एतस्य श्रृङ्गानि। मध्य उ ह वा एष एतद् अपाम्। तासु वारवन्तीयम् ॥

(iii) The entire core of the sun is filled with आपः and this gives vitality to the Sun. It is on account of this आपः that the sun can rise in the morning and set in the evening. It is its vital strength for heat and light. As *Aitareya Brahmana* confirms it in IV, 20

एष (आदित्यः) वा अब्जा अद्भ्यो वा एष प्रातरुदेति अपः सायं प्रविशति ॥

Sun is virtualy *Apah* and *Apah* is sun. There is no distinction between the two, such is the outstanding importance of this substance in the sun, says *Shatapatha Brahmana* in X, 6, 5, 2

आपो वा ऽ र्कः

(6) No Solid Substance in the Sun.

Modern science believes that "the sun is a wholly gaseous state."

(Abetti, *The Sun*, p. 342)

The Sun's mean density which is only one quarter of the earth's density leads the scientist to a belief in its gaseous state. Abetti further observes in this connection :

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"The earth's density is some four times as great as the Sun's. Since the mean density of the earth is 5.5 times that of water, that of the Sun (taking the density of water as unit) is 1. 4. Already we are beginning to glimpse the fact that the Sun cannot be in a solid state, for its constituent materials are on the average much less dense, than those solid materials of which the earth is composed."

(*The Sun*. p. 40)

Prof. Karl Kiepenheuer also holds thus :

"The Sun is one among a host of stars, that is, it is a gaseous body with a diameter of 8,64,000 miles and a mass of 2.10^{33} grams."

(*The Sun*, p. 12)

What cause can be attributed to the gaseous state of the Sun ? A question arises, why, inspite of the fact that the average density of the sun is 1.4 grams per cubic centimeter and despite the fact that matter on the sun has almost one and one-half times the weight of water, (according to scientific calculation) is the Sun taken as gaseous ?

The answer is traced only in the very high surface temperature of the sun, which is almost as high as 11000°F. This is unimaginable, inasmuch as the temperature of the red-hot iron is 1100°F. and that of the white-hot filament of an electric bulb almost 3600°F. and at so high a surface temperature as 11000° F. one can imagine, even carbon, which offers the greatest resistance to heat, would melt.

(7) Earth Not Born out of the Sun.

If the earth were separated from the sun, as is commonly believed, then Sun's density would be a little

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greater or equal to that of the earth, but it is not so.

The vedic view holds that earth came into existence first and later came the sun. Speaking technically, the earth was created out of the lower portion of the mundane egg (महदण्ड) and hence it is dense and heavy.

Prof. George Gamow observes in this connection :

"Until a few decades ago it was generally assumed that the earth, as well as the other planets, were formed from the hot material of the sun and that its interior had just not had time to cool. We know now that this is not so and that the planets of the solar system were formed by the aggregation of cool interstellar gas and dust particles during the formation of the Sun itself."

(*Matter, Earth and Sky*-p. 373).

(8) Nearness of the Sun and Earth.

Today the Sun is about 90 million miles away from the earth, but earlier, when the *cosmic manifestation* was yet in its initial stages, when the earth was created, then came the Sun and the atmosphere was yet a squeezed space, the sages held that the Earth and the Sun were very close together and could almost be touched.

(a) The *Taittiriya Samhita* VII, 3, 10 holds that the Sun was previously in the region of the Earth and the gods pushed it up to the heavenly regions—the gods here imply the "vital airs".

असावादित्योऽस्मिन् लोक आसीत् तं देवाः पृष्ठैः परिगृह्य सुवर्गं लोकम् अगमयन् ।

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(b) Again, the *Shatapatha Brahmana* while alluding to the opening verse of the text of the *Samaveda* अग्न आयाहि वीतये, holds that the Sun was within arm's length from the earth and could be touched, so close it was. The text of the *Shatapatha Brahmana* 1, 4, 1, 22 says :

अग्न आयाहि वीतये–इति । तद्वेति भवति
वीतये–इति । समन्तिकमिव ह वा इमे ऽग्रे लोका
आसुः–इति । उन्मृश्या हैव द्यौरास ॥

How were they separated and thrown far off—as a result of the action of the *vayu* which expanded immensely on account of the effect of Agni ?

The *Taittiriya Samhita* answers this, saying

इमे वै सहास्तां ते वायुर्व्यवात् ।

(III, 4, 3)

It is interesting to note here that at that time there was no heat on the earth, though the Sun emitted heat to make the earth hot and blazing and a curious phenomenon is related in *Jaimini Brahmana*, as to how this Agni came to the interior of the earth, by an exchange of places. The *Jaimini Brahmana* I, 87 holds :—

आदित्य वा एतद् अत्राग्र आसीद् यत्रैतत् चात्वालम्
अदोऽग्निः स इदं सर्वं प्रातपत् ।
तस्य देवाः प्रदाहाद् अबिभयुः । ते अब्रुवन् ।
सर्वं वा अयम् इदं प्रधक्ष्यति वीमौ परिहरामेति ॥

Sun was first here, close to the earth and was roasting the earth by its heat. The gods were afraid of its scorching

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heat and they decided to change the places for both of them. Agni went to the interior of the earth which became अग्निगर्भा.

The text ये अग्नयः पुरीषिण आविष्टा पृथिवीमनु (XXXV, 3) of the *Kapishthal Shakha* makes it clear. The *Maitrayani Samhita* also holds that the gods took the Sun to the uppermost regions.

इह वा असा आदित्य आसीत् तमितोऽध्यमुं लोकमहरन् ।

(9) Separation of the Worlds and the View of Modern Science.

Some scientists have now come to believe in the closeness of the universes at the earliest stages. It is held that "Various universes were much closer together when the solar system was formed then they are now—the various universes congregated together in a volume of space much smaller than they now occupy."

(*Life On the Other Worlds*, p. 150)

There are numerous texts in the *Brahmanas* to show that the worlds were together so much so that the hevenly bodies could be touched from the earth and that they were separated later.

Modern scientific investigations also confirm the same thing. "In fact it is obvious that the moon must have been revolving, *almost within touch* of the Earth's surface immediately after the separation."

(*Biography of the Earth*–p. 48)

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(b) The Vedic View

Let us look to the vedic evidence.

(a) The *Tandya Brahmana* VII, 10, 1, relates in detail, the story of the separation of the worlds, in these words.

इमौ वै लोकौ सहास्ताम् । तौ वियन्तावब्रूतां विवाहं विवहावहै सह नावस्तु–इति ॥

(VII, 10, 1)

इमे वै लोकाः सहासन् । ते ऽ शोचन् तेषामिन्द्रः एतेन साम्ना शुचम् अपाहन्यत् ॥

(*Ibid.* VIII, 19)

(b) The *Jaimini Brahmana* expresses the same thing in the following words :—

(i) इमे वै लोकाः सह सन्तस्त्रेधाव्यायन् ते अशोचन् यथैकस्त्रेधा विच्छिन्नः शोचेद् एवम् ।

(III, 72)

(ii) इमे वै लोका सह सन्तौ व्यैताम् ।
तयोर्न किंचन समपतत् ते देवमनुष्या
अशनायन् .....ताभ्याम् व्यवहेताम् ॥

(*Ibid.* I, 145)

"These worlds being together went asunder. Nothing whatever reached them (i.e. nothing from earth reached heaven and vice versa)." (Caland's translation)

(c) The *Kathaka Samhita* holds the same view that these worlds were close together in the beginning, but were later separated by Vayu.

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(i) इमे वै सहास्ताम् । ते वायुर्व्यवात् ते गर्भमदधाताम्
ततोऽजावशा अजायत । ताम् अग्निः अग्रसत ॥

(XIII, 12)

(ii) इमे वै सहास्ताम् । ते यथा वेणू सन्धाव्येते
एवं समधाव्येताम् ॥

(*Ibid.*)

This original stage was a stage of great instability. The worlds were oscillating forward and backward till they were stabilized by the action of the boundaries and the vayu etc. in space.

(10) Stabilization of the Worlds.

The *Rigveda* II, 12, 2, clearly refers to this condition of the worlds till they were stabilized and firmly implanted in their positions. The vedic text holds :

यः पृथिवीं व्यथमानामदृंहद्
यः पर्वतान् प्रकुपितां अरम्णात् ।
यो अन्तरिक्षं विममे वरीयो
यो द्यामस्तभ्नात् स जनास इन्द्रः ॥

(*Rigveda* II, 12, 2)

Griffith has translated this verse thus :

"He who fixed fast and firm the earth that staggered and set at rest the agitated mountains. Who measured out of the air's wide middle region and gave the heaven support, He, men is Indra."

This is a graphic description of the staggering unstable worlds in the earliest stages and how they were

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made firm by Indra-*electro-magnetic waves*, in later stages.

(b) The *Rigveda* II, 17, 5 also tells the same thing :

स प्राचीनान् पर्वतान् दृंहदोजसा
अधरात्रीनमकृणोदपामपः ।
अधारयत् पृथिवीं विश्वधायसम्
अस्तभ्नान् मायया द्यामवस्रसः ॥

Griffith translates it very picturesquely in these words :

"He, with his might, made firm the forward bending hills, the downward rushing of the waters He ordained. Fast he upheld the earth that nourisheth all life and stayed the heaven from falling, by his wondrous skill."

(c) We find the same thought again in *Rigveda* X, 149, 1

सविता यन्त्रैः पृथिवीमरम्णाद्
असकम्भने सविता द्यामदृंहत् ।

"*Savitar* fixed the earth with bands to bind it, and made heaven steadfast where no prop supported."

(d) The same truth is emphasized in *Rigveda* VII, 99, 3

व्यस्तभ्ना रोदसी विष्णवेते
दाधर्थ पृथिवीमभितो मयूखैः ।

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"Both these worlds, Visnu, hast thou stayed asunder and firmly fixed the earth with pegs around it." (Griffith's translation.)

(e) Again we have the following texts to support the above view

(i) महीं चिद् द्यामातनोत् सूर्येण
चास्कम्भ चित् कम्भनेन स्कभीयान ।

(*Rigveda* X, 111, 5)

(ii) यस्तस्तम्भ सहसा वि ज्मो अन्तान्
बृहस्पतिः त्रिषधस्थो रवेण ।

(*Rigveda* IV, 50, 1)

(iii) हविषो गृहीताद् इमे लोका उदवेपन्त
तान् देवा एतेन यजुषा अदृंहन् ।

(*Maitrayani Samhita* IV, 1, 5)

(f) In the process of stabilization, these worlds keep arranging themselves from below upwards and on the other side, from above downwards. This is what the *Tandya Brahmana* (VII, 10, 5) holds,

इतो वा इमे लोका उर्ध्वाः कल्पमाना यन्ति
अमुतोऽर्वाञ्चः कल्पमाना आयन्ति ।

(g) The *Rigveda* III, 54, 6 takes the same view of the process :—

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नाना चक्राते सदनं यथा वेः
समानेन क्रतुना संविदाने ।

".....though meeting together, they leave a space, like a bird's nest, between them". (Griffith's comment on this verse).

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CHAPTER V

Solar Radiation

The Atomic Nuclei of Modern Science.

According to modern science, "all light, no matter whether from space, from an electric bulb, or from a glow worm, is emitted by atoms or by the even smaller electrons."

(Karl Kiepenheuer—*The Sun* p. 45)

And "even cosmic radiation which rains down on us from outer space with the velocity of light (1,86,000 miles per second) appears to have a similar composition of atomic nuclei." (*ibid*-p. 56)

These atomic nuclei, in the vedic terminology, are called the रश्मयः —sun, moon, the maruts, the vayu, the nakshatras etc,—all of these have the *atomic nuclei* which radiate light; and it is only on account of these radiations that the solar atmosphere is stable.

cf. मासा रश्मयः । रश्मयो मरुतः ।
तैरसावादित्यो धृतः ॥

(*Jaimini Brahmana* I, 137)

These atomic nuclei produce several physical processes on the Sun. "Electrons and protons fly about freely and when they rise upto the solar surface where the temperature is much lower, they are recaptured by the

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protons there. During this process heat is liberated just as it is during the condensation of water in air.

This gives rise to granular convection currents with a constantly changing field of contiguous whirlwinds. The wind velocities here are well over a thousand miles per hour, while in our own atmosphere, even during the worst hurricanes, they rarely exceed 200 miles an hour."

(*The Sun*, p. 44)

These atomic nuclei exist in the sun, in the moon, and in the maruts and the vatas that pervade the atmosphere. The technical word used in the vedas for the rays of the Maruts, is अभीशवः . We have a reference to this in *Rigveda* I, 38, 12

स्थिरा वः सन्तु नेमयो रथा अश्वास एषाम् ।
सुसंस्कृता अभीशवः ॥

and similarly in *Rigveda* V, 61, 2, addressed to maruts, we have

क्व वो ऽश्वाः क्वा ऽभीशवः
कथं शेक कथा यय ।

Sun rays are most effulgent.

Of all these radiations, the rays of the sun are the brightest and the purest. The *Yajurveda* II, 26 confirms this

स्वयंभूरसि श्रेष्ठो रश्मिः ।

and commenting on this, the *Shatapatha Brahmana* says

एष वै श्रेष्ठो रश्मिः यत्सूर्यः ।

(I, 1, 3, 16)

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(2) Multi coloured Nuclei.

According to the vedic view, these radiations are multi coloured.

The *Maitrayani Samhita* holds in II, 2, 21 बहूनि वै रश्मिनां रूपाणि and it is interesting to note that the *Nighantu,* (I, 5) gives 15 classifications of these atomic nuclei according to their colour, intensity and variety. These names are :—

(1) खेदयः	(6) साध्याः	(11) सुपर्णाः
(2) किरणाः	(7) अभीशवः	(12) वनम्
(3) गावः	(8) दीधितयः	(13) उस्राः
(4) रश्मयः	(9) गभस्तयः	(14) वसवः
(5) मरीचिपाः	(10) मयूखाः	(15) सप्तऋषयः

Corresponding to these 15 names, the शुचिः अग्निः, the solar heat, has fifteen different classifications, and those names are available in the *Vishnu Purana* 1, 10, 14. The *Brahmanda Purana* XIII, 38 gives fourteen different classifications of this शुचिः अग्निः which pervades the Sun. The *Shatapatha Brahmana* II, 5, 1, 4 classifies the शुचिः अग्निः thus :—

(1) शुचिः	(3) सहस्रः	(5) विविधः
(2) महिषः	(4) अद्भुतः	(6) अर्कः

In addition to this list, the names available in the vedic literature are

(7) अनीकवान्	(10) यष्टिकृत	(13) अन्नादः
(8) वाजसृक्	(11) सुरभिः	(14) प्रविष्टः
(9) रक्षोहा	(12) वसुः	(15) रुक्मराट

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(3) A Thousand Rays of the Sun.

In the *Rigveda* VI, 47, the rays of the Sun are given as 1000,

युक्ता ह्यस्य हरयश्शतादश ।

(*Rigveda* VI, 47, 18)

Commenting on the word "a thousand", the *Jaimini Brahmana* I, 44, 5 holds, that these 1000 rays surely pertain to the sun and to no other body.

सहस्रं हैत आदित्यस्य रश्मयः ।

In other texts, we have the same epithets used, for instance, in *Mahabharata* यस्य रश्मिसहस्रेषु , in *Kapishthal Samhita* (28, 4) अग्ने सहस्राक्ष. In the *Rigveda* I, 80, 12, again we have

न वेपसा न तन्यतेन्द्रं वृत्रो वि बीभयत् ।
अभ्येनं वज्र आयसः
सहस्रभृष्टिरायतार्चन्ननु स्वराज्यम् ॥

'It is only on account of the atomic association (संसर्ग) that thou art so many as a thousand different types of solar radiations'. And on account of this variety in the colours, we notice, according to the vedic view, (cf. *Kapishthal Samhita* XXX, 13, छन्दांसि वा अग्नेर्वासः), a similar classification in their magnetic fields.

(4) Another Classification of Solar Nuclei.

These 1000 types of solar radiations are classified broadly into three divisions according to the *Vayu Purana* LIII, 19 *Brahmanda* XXIV, 26 and *Matsya* CXXVIII, 18.

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The solar radiations are of three types which emit *rain, cold* and *heat* and it is on account of these radiations that we have rains on this earth and cold waves etc.

(a) Of these 1000 rays, the 400 radiations are called चित्रमूर्तयः and they cause rain.

cf. तस्य रश्मिसहस्रं तु वर्ष-शीतोष्ण-निस्रवम् ।
तासां चतुःशता नाड्यो वर्षन्ते चित्रमूर्तयः ॥

The Sun drops down rain on earth only through these atomic nuclei. This fact is stated in *Maitrayani Samhita* II, 4, 8

अग्निर्वा इतो वृष्टिमीष्टे
मरुतोऽमुतश्च्यावयन्ति
तां सूर्यो रश्मिभिर्वर्षति ॥

(b) Further 300 rays are known as हिमसर्जना in the vedic literature and this name is synonymous with हिमोद्गताः, हिमवाहा and हिमोद्भवाः These rays are responsible for causing the cold waves.

(c) The third type is called घर्मसर्जना (300).

(d) This threefold division of solar rays is responsible for producing these three seasons as mentioned in the *Rigveda* I, 164, 2

त्रिनाभि चक्रम् अजरमनर्वं
यत्रेमा विश्वा भुवनाधि तस्थुः ।

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Yaskacharya, commenting on this triad, says :

त्रिनाभिचक्रम् । त्रि–ऋतुः संवत्सरः । ग्रीष्मो वर्षा हेमन्त इति ।

(*Nirukta* IV, 27)

(5) The Cold-Wave Nuclei and the Ice Ages :

The primary ray out of the group of solar rays which emit cold and are known as हिमसर्जना is known as the सुषुम्णा group of atomic nuclei. This causes coldness in the moon. The other rays of the हिमसर्जना group are invisible and are known as मेधाः / मेध्याः or मध्याः The *Shatapatha Brahmana* in V, 3, 4, 13 refers to मेध्याः, as under

मेध्या वा ऽ एता आपो भवन्ति
या आतपति वर्षन्ति ।

Another name given to this group of solar rays, popularly known as हिमसर्जना is चन्द्राः, on account of their peculiar effect on the lunar sphere.

The *Taittiriya Brahmana* I, 7, 6, 3, refers to this चन्द्रा ह्यापः and the *Yajurveda* also alludes to these rays in XII, 102

यश्चापश्चन्द्राः प्रथमो जजान ।

These हिमसर्जना rays are responsible for causing cold-waves on the earth and it is curious to note that these cold waves are caused by solar rays of that particular type. And these rays have a close connection with the *ice ages*.

The scientist believes that there was a time, not many thousand years ago, when a large part of Europe

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and North America was covered with glaciers, with perpetual ice loaded in heavy masses. During the Ice Age, displacements of the ice sheets have been noticed but no cause of these retreats has yet been discovered by the scientist.

Surely, according to the vedic seers, coldness also is a quality of a particular type of solar rays. The आपः which engulfs the solar atmosphere does contain "coldness". A text of the *Vayu Purana* XXIV, 152 testifies : शैत्यमप्सु. As and when the आग्नेय atoms get separated from the आपः, coldness results. Fogs and mists are also connected with these "cold currents", and perpetual ice in mountains is also the result of these हिमसर्जना rays of the sun.

Future science will certainly discover the cycles which bring about glacial periods on this earth.

(6) The Heat-Wave Nuclei.

The Heat Wave Nuclei are the घर्मसर्जना rays and they are 300 in number, these are also called शुक्रा or शुक्रा or कुहकाः or ककुभः, गावः, विश्वभृतः. These rays are also known as गावः.

The *Rigveda* IX, 97, 35 is clear on this reference

सोमं गावो धेनवो वावशानाः ।

and *Nirukta* XIV, 15, commenting on this, translates the word गावः as solar rays. These types of solar rays give nourishment to the whole universe, just as गौः 'the cow' gives nourishment to all that exists on earth.

As *Shatapatha Brahmana* III, 9, 2, 14 affirms: गौर्वा इदं सर्वं बिभर्ति. The entire heat in the Sun is due to this

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group of rays called घर्मसर्जना and it is only to this type that the *Rigveda* I, 154, 6 refers in यत्र गावो भूरिशृङ्गा अयासः The word गोमातरः is also used in the Vedas, and this is synonymous with the पृश्निमातरः the rays of variegated colours. For instance *Rigveda* I, 85, 3 states :

गोमातरो यच्छुभयन्ते अञ्जिभिः ।

and *Rigveda* I, 85, 2 holds :

अधिश्रियो दधिरे पृश्निमातरः ।

Madhava, the great vedic commentator translates पृश्निमातरः as गोमातरः .

On account of the fact that these sun rays known as गावः are the heat radiating rays, the sun itself has been called गौः by the vedic commentators. For instance, we read in *Nirukta* II, 6 आदित्योऽपि गौरुच्यते and in *Aitareya Brahmana* IV, 20 गावो वा आदित्याः. The sun in its relation to the rays अश्मापृश्निः is itself called अश्मापृश्निः. The *Shatapatha Brahmana* affirms this, saying

असौ वा आदित्योऽश्मापृश्निः

(IX, 2, 3, 14)

These गावः are also called भूरिशृङ्गाः 'having many horns', and surely these rays of the sun have horns. As *Jaimini Brahmana* II, 145 clarifies :—

ये ह वा एते आदित्यस्य रश्मय
एतानि ह वा एतस्य शृंगाणि ॥

Surely, those that are the rays of the sun, are its (Sun's) horns.

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(7) Seven Principal Rays of the Sun.

There are seven principal rays of the sun which are the most excellent of the 1000 rays of the sun. These seven rays are called सप्तऋषयः, and of these rays are born all the planets. This is what *Vayu Purana* LX, 99 says.

खे रश्मिसहस्रं यत्
पराङ् मया समुदाहृतम् ।
तेषां श्रेष्ठाः पुनः सप्त
रश्मयो ग्रहयोनयः ॥

The following are the names of the seven rays

1. सुषुम्णः
2. हरिकेशः this name is mentioned, with reference to the sun in *Rigveda* X, 139,1 सूर्यरश्मिर्यहरिकेशः
3. विश्वकर्मा The *Kaushitaki Brahmana* makes a mention of this in V, 5 असौ वै विश्वकर्मा योसौ तपति
4. विश्वश्रवाः In *Shatapatha Brahmana* the name is given as विश्वव्यचा
5. संपद्वसुः or संयद्वसुः according to *Shatapatha Brahmana*
6. अर्वावसुः or अर्वाग्वसुः in another text
7. स्वराट्

(8) Other Important Rays of the Sun

Apart from the seven primary solar rays which we have mentioned heretofore, there are other important and effective solar rays with different colour and intensity in each case, that are mentioned in the vedic literature.

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To omit a passing reference to them in this treatise would be to keep incomplete the vedic literature on the sun. We, therefore, take up those names :

(1) अङ्गिरस rays : *Jaimini Brahmana* 11, 366 refers to these : तद् ये ह वा एत आदित्यस्योदञ्चो रश्मयस्त आदित्याः। ये दक्षिणास्तेऽङ्गिरसः ॥

Those with a direction of the electro-magnetic field going Northward are called the आदित्य rays, and those going southward are called the अङ्गिरस. Thus there are two different types of rays, depending on the direction of their field.

(2) आदित्य rays are also called गावः and गावो वा आदित्याः is the text of the *Aitareya Brahmana* which takes them as snake-like सर्प्या वा आदित्याः, they move like the coil of the snake.

It is interesting to note in this connection a text of the *Yajurveda* in chapter thirteen, mantra 8, in which the snake-like field of such rays is mentioned. The text runs thus :-

ये वा अमी रोचने दिवो ये वा सूर्यस्य रश्मिषु
ये अप्सु षदांसि चक्रिरे तेभ्यः सर्पेभ्यो नमः ॥

(*Yajurveda* XIII, 8)

'We bow to those vital rays of the sun, in the form of snakes, etc. etc.'

(3) वृष्टिवनिः A mention of these rays made in the *Shatapatha Brahmana* (XIV,2,1,21)

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सूर्यस्य ह वा ऽ एको
रश्मिः वृष्टिवनिर्नाम
येनेमाः सर्वाः प्रजा बिभर्ति ॥

The *Taittiriya Samhita* II, 4, 10 also makes a mention of this type. एषा वा ओषधीनां वृष्टिवनिः। तया एव वृष्टिमाच्यावयति 'These rays belong to that group of solar rays which cause rain.'

(4) मरीचिपाः We find a reference to this in the *Taittiriya Samhita* आदित्यस्य वै रश्मयो देवा मरीचिपाः

(VI, 4, 5)

These rays also belong to the rain-group.

(5) सुरुचः We have a reference to these rays in the *Atharvaveda* IV, 1, 1. This is an invocation to the Sun and the text reads thus :

ब्रह्म जज्ञानं प्रथमं पुरस्ताद्
वि सीमतः सुरुचो वेन आवः ।
सं बुध्न्या उपमा अस्य विष्ठाः
सतश्च योनिमसतश्च वि वः ॥

On this Yaskacharya comments in *Nirukta* I, 7 सुरुचः आदित्यरश्मयः These rays emit light and it is on account of these rays that the worlds are lustrous. The *Shatapatha Brahmana* affirms this in VII, 4, 1, 14 इमे लोकाः सुरुचः And the *Yajurveda* XIII, 22 also mentions the same thing :

यास्ते ऽ अग्ने सूर्य्ये रुचो
दिवमातन्वन्ति रश्मिभिः ।

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ताभिर्नोऽअद्य सर्वाभी
रुचे जनाय नस्कृधि ॥

(6) अमा This is another group of solar rays, to which is attributed the popular title of अमावस्या. This dark night takes place when the moon also enters the same sign of the zodiac in which the Sun resides for a particular month. This fact is confirmed in a popular text.

कलादयाविष्टस्तु प्रविष्टः सूर्यमण्डलम्
अमाख्यरश्मौ वसति अमावस्या ततः स्मृतः ॥

(*Vishnu Purana* II, 12)

(7) हंसाः A reference to this group of solar rays which move in a magnetic field of the form of हंस, is found in the *Rigvedic* text as under :

हंसः शुचिषद् वसुरन्तरिक्षसद्धोता
वेदिषदतिथिर्दुरोणसत् ॥

(*Rigveda* IV, 40, 5)

On this, Yaskacharya comments thus :—

हंसा सूर्यरश्मयः

(*Nirukta* XIV, 31)

On the text of the *Yajurveda* XII, 14

हंसः शुचिषद् वसुरन्तरिक्षसद्धोता ।

the *Shatapatha Brahmana* VI, 7, 3, 11 has this clarification :

असौ वा ऽ आदित्यो हंसः शुचिषत् ॥

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(8) ऋभवः Yaskacharya refers to this group in *Nirukta* XI, 16, thus: आदित्यरश्मयो ऽपि ऋभव उच्यन्ते. Sayana also in his commentary on the text of the *Tandya Brahmana* XIV, 2, 5, translates ऋभव as referring to solar rays.

(9) सुपर्णाः These rays are mentioned in the *Rigvedic* text X, 73, 11 वयः सुपर्ण उप सेदुरिन्द्रम् and *Nirukta* IV, 3 comments on this : सुपतना आदित्यरश्मयः The same group of rays is mentioned in another text of the *Rigveda* I, 105, 11 सुपर्ण एत आसते मध्य आरोधने दिवः ॥

(10) हरितः We have a mention of this group in *Rigveda* I, 115, 4 which is an invocation to the Sun.

यदेदयुक्त हरितः सधस्था—
दाद्रात्री वासस्तनुते सिमस्मै ॥

and Yaskacharya clarifies in *Nirukta* IV, 11 that these हरितः are the solar rays, (हरितः) हरणान् आदित्यरश्मीन् . The colour of these rays is blue as Skandasvami, the great vedic commentator affirms, in reference to the *Rigvedic* text I, 50, 8 सप्त त्वा हरितो रथे वहन्ति देव सूर्य in the following words:

हरित्–शब्दो हरित–शब्दपर्यायः ।
नीलवर्णवचनः ॥

(11) शुचिकिरण The *Mahabharata*, Shanti Parva, chapter 372 refers to this as a medicinal treatment which closely relates to chromopathy according to some scholars. Water kept in the solar rays called शुचिकिरण for eight months is a great tonic for health.

यो ऽष्टमासांस्तु शुचिना किरणेनोक्षितं पयः ।
प्रत्यादत्ते पुनः काले, किमाश्चर्यमतः परम् ॥

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(12) अक्षितयः The *Yajurveda* V, 7 refers to this group of solar rays.

Yaskacharya clarifies the meaning of अक्षितयः as सूर्यरश्मयः *Nirukta* V, 11.

(13) शिपयः These are the solar rays which appear first with the sunrise शिपिसंज्ञैः बालरश्मिभिः says Durgacharya, the great vedic commentator. *Nirukta* V, 7 also testifies : शिपयोऽत्र रश्मय उच्यन्ते ॥

(14) पशुः These are solar rays, says the *Kapishthala Samhita* पशवः आदित्याः

(15) सुकृतः This is also a group of solar rays to which *Shatapatha Brahmana* I, 9, 3, 10 refers thus :

तस्य सूर्यस्य ये रश्मयस्ते सुकृतः ॥

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CHAPTER VI

The Earth

The Earth is a planet. It is the largest of the four inner planets. It rotates round its axis once a day and revolves round the sun in 365.256 days which period is known as a sidereal year. Its axis of rotation is inclined to the plane of its orbit by an angle of $66\frac{1}{2}°$. The earth, in the course of its motion, turns toward the sun periodically, in its northern and southern hemispheres, and this fact causes the change of seasons.

(1) Earth Born out of the Sun—

Vedic view different from Science :

According to modern science, the earth is born out of the Sun. The vedic view is different from this.

Let us examine Prof. Gamow's statement regarding creation of the earth. He says : "...the earth from the very beginning of its existence as a gaseous and later molten piece of matter torn away from the young sun by some passing star, down to the very end, when it will be melted again in the last desperate explosion of its dying parent."

(*Biography of the Earth*, p. 237)

On the other hand, realizing the complexity of the problem about the order of creation between the sun and the earth, the vedic sage has posed a question in *Rigveda* I, 185, 1, in these words :

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कतरा पूर्वा कतरा परायोः कथा जाते कवयः को वि वेद ।
विश्वं त्मना बिभृतो यद्ध नाम वि वर्तेते अहनी चक्रियेव ॥

"Which of these is elder ? Which later ? How were they born ? Who knoweth it, ye sages ? The *Yajurveda* XXXVII, 4 is, however, certain that earth was born first in the Cosmic creation.

cf. देव्यो वम्रयो भूतस्य प्रथमजा ।

On this verse, the *Shatapatha Brahmana* XIV, 1, 2, 10 comments thus :

इयं वै पृथिवी भूतस्य प्रथमजा ।

The same *Brahmana*, further, holds very clearly, that of all the regions, the region of earth was created first.

इयमु पृथिवी वा एषां लोकानां प्रथमाऽसृज्यत ।

(VI, 5, 3, 1)

Strangely enough, the Chapter of Genesis in the Bible also holds the same view.

(2) Interior of the Earth

The interior of the earth is extremely hot. The *Shatapatha Brahmana* XIV, 9, 4, 21 mentions this fact in अग्निगर्भा पृथिवी ।

The *Yajurveda* XI, 57 holds :

माता पुत्रं यथोपस्थे साग्निं बिभर्तु गर्भ आ ।

'the earth holds fire just as the mother holds the child.' Commenting on this, Yajnavalkya writes : यथा माता पुत्रमुपस्थे बिभृयादेवमग्निं गर्भे बिभर्त्विति ।

(*Shatapatha Brahmana* VI, 5, 1, 11)

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The observations of science are to the same effect. According to modern scientific researches, "In fact, the study of the Earth's interior indicates that most of its body is still in a molten state and that the *solid ground* of which we speak so casually, is actually only a comparatively thin sheet floating on the surface of the molten magma."

(*Biography of the Earth*-p. 27)

Further, Prof. Gamow observes, "the temperature of the earth must reach the melting point of rocks (between 1200° C and 1800° C) at a depth of only 50 km. beneath the surface, that is, at less than one percent of the total distance from the centre. All the material farther below. forming more than 97 percent of the Earth's body must be in a completely molten state." (*Ibid.*)

And that during the last two billion years, the temperature of most of the earth has remained practically unchanged and that the cooling effect has been confined to the outer parts of its body."

(*Ibid.* p. 99)

How this crust of the earth escaped that burning, molten state, is described in the form of an interesting metaphorical dialogue in the *Taittiriya Samhita.* Prajapati wanted to place Agni (fire) on the earth. The earth said, "Do not place the fire on me, I shall be burnt ; and I shall tremble and feel agonised by that fire, and you will become a sinner on that account." Prajapati agreed to help the Earth and said, "I shall try in a way that you do not get burnt." And he then, placed the sacrificial altar, in the form of crust, the outer part

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(technically called इष्टका, the bricks) and recited the mantra प्रजापतिस्त्वा सीद and thus did the outer surface of the earth escape the extreme melting state.

The original text is quoted below for the interest of the aspiring student :—

प्रजापतिरग्निमचिकीषत । तं पृथिव्यब्रवीत्
—न मय्यग्निं चेष्यसेऽति मा धक्ष्यति। सा त्वाति
दह्यमाना विधविष्ये । स पापीयान् भविष्यसीति ।
सोऽब्रवीत्—तथा वा अहं करिष्यामि यथा त्वा
नाति धक्ष्यतीति । स इमामभ्यमृशत् प्रजापतिस्त्वा
सादयतु । तया देवतयाङ्गिरस्वद् ध्रुवा सीद ।
इतीमामेवेष्टकां कृत्वोपाधत्तानतिदाहाय ॥

(तै० संहिता 5, 5, 2)

(3) **Rotundity of the Earth**

That the earth is round is supported by numerous statements in the vedic literature. The *Shatapatha Brahmana* VII, 1, 1, 37 holds :

परिमण्डल उ वा अयं (पृथिवी) लोकः ।

'this earth is round in shape'.

In *Kathaka Brahmana*, the same truth is expressed :

मण्डलो ह्यं लोकः

The *Jaimini Brahmana* I, 257 states this fact quite emphatically in a metaphorical way—not only the earth, but the sun, moon and other planets are all spherical in form.

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स एष प्रजापतिः अग्निष्टोमः
परिमण्डलो भूत्वा अनन्तो भूत्वा
शये। तदनुकृतीदम् अपि अन्या देवताः
परिमण्डलाः। परिमण्डल आदित्यः, परिमण्डलः
चन्द्रमाः, परिमण्डला द्यौः। परिमण्डलमन्तरिक्षम्।
परिमण्डला इयं पृथिवी॥

(I, 257).

Prajapati stood, engulfing the infinite expanse in a round form. Following Him the other gods also assumed the circular phase. It is, thus, that the sun is a sphere, the moon, the firmament and the entire space and this earth.

The modern scientist is in agreement with this view,

Einstein has conceived of a universe that is spherical. Compare, "Einstein's finite, spherical universe.....it is possible to compute the size of the universe. In order to determine its radius, however, it is first necessary to ascertain its curvature."

(*The Universe and Dr. Einstein*, p. 105.)

But the idea of the vast universe is so incomprehensible that there can be no conclusive view about the shape of the universe, although for facility of mathematical calculations we take it as a sphere and thus go to determine its radius as 2000 million light years and so on, so forth.

Dwelling on this aspect of uncertainty, Paul Koudark writes,

"The overall figure of the universe is still far from certainly decided; the exploration of every new field necessarily

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involves uncertainties and surprises. But the possibility is not excluded that space has a positive curvature which entails its closure. There is a better than 50/50 chance, I think, that it is in fact closed and finite."

(*The Expansion of the Universe*, p. 143)

Accordiug to the Vedic view, the entire universe is finite and is enveloped by Prakriti.. Brahman alone is infinite. This is how the concentric circles are formed.

इन्द्रियेभ्यः परा ह्यर्था अर्थेभ्यश्च परं मनः
मनसस्तु परा बुद्धिर्बुद्धेरात्मा महान् परः ॥
महतः परमव्यक्तमव्यक्तात् पुरुषः परः
पुरुषान्न परं किंचित् सा काष्टा सा परा गतिः ।

"Higher indeed than the senses are their objects, higher than their objects is the mind, intellect, higher than the mind, higher than intellect is the Mahat-tattva. Higher than this great one, is the unmanifested, and higher than the unmanifested is the infinite God—higher than that is nought."

The Purusha-Sukta of *Rigveda* X, 90 maintains that one quarter *That* is manifest and *His* three quarters are unmanifest.

पादो ऽस्य विश्वा भूतानि त्रिपादस्यामृतं दिवि ।

The entire Prakriti is the last engulfing circle both in the manifest and unmanifest form. Beyond that circle is God, the Infinite Soul, "who is not manifested but is beheld by the subtle and attentive intellect of men possessing subtle sight."

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As the *Kathopanishad* maintains:

एष सर्वेषु भूतेषु गूढोत्मा न प्रकाशते ।
दृश्यते त्वग्रया बुद्ध्या सूक्ष्मया सूक्ष्मदर्शिभिः ॥

(I,3,12)

The Greek View.

According to old Greek philosophers, the *circle* and the *sphere* were the only perfect type of diagrams and the God's universe which is an act of perfection could not but be spherical. The original Copernican system also concurred with this view that the orbits of planets including that of the earth are circles. It was Tycho Brahe (1546-1601), a famous Danish astronomer who came to the conclusion by direct observational methods that the motion of planets is not in concentric circles. Later it was Kepler, the German astronomer who found that "while in their motion around the sun, the planets do not follow exactly circular orbits they describe another class of curves just as famous as circles in the frame of old Euclidian geometry. This class of curves is known as *conical sections.* If the plane is perpendicular to the axis of the cone, the cross-section becomes a circle, if somewhat tilted, it is an ellipse. When the plane becomes parallel to the side of the cone, it is a parabola and with a further tilt it becomes a hyperbola. All are elliptical shapes and Kepler formulated that all planets move along elliptical orbits with the Sun located in one of the foci.

(4) Earth as a Magnet.

One who has ever used a compass, will know that

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earth is a huge magnet. The fall of the apple was connected by Newton, with earth's gravity and his *law of gravitation* is too well-known a fact and needs no elucidation.

The vedic literature furnishes its own observations in this respect. We have a verse in the *Rigveda* VII, 15, 14, which points to that direction. It holds that the entire earth contains *magnetic filings* in the interior.

The earth, herein, is called आयसी, containing iron filings which have assumed magnetic properties under the influence of the Maruts.

The same thing is echoed in the *Brahmanas*. For instance, the *Aitareya Brahmana* I, 23 holds

ते (असुरा) वा अयस्मयीम् एवेमां पृथिवीम् अकुर्वन् ।

Mark the word अयस्मयीम्=लोहयुक्ताम्

The *Kaushitaki Brahmana* holds the same view.

(असुराः) अयस्मयीं पुरीं अस्मिन् अकुर्वन् ।

(VIII, 8)

The *Taittiriya Brahmana* also has the same thing to state

अस्य वै (भूः) लोकस्य रूपम्
अयस्मय्यः सूच्यः ।

(III, 9,6,5)

The word अयस्मय्यः सूच्यः corresponds to iron filings.

(A) Doubts of Modern Science.

It is, however, not clear, how this magnetic ore or these iron filings could exist in the molten interior of the

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earth, or whether the earth's interior actually contains such a high temperature as is conceived by modern science or it is to some degrees, less than that. A scientist like Gamow has, himself, raised this doubt on the ground that there can be no trace of magnetisation above a certain temperature point, and there must be complete demagnetisation of all substances at a heat exhibited by the earth's interior. Prof. George Gamow observes:

"However. upto the present time, we still do not know, what causes this magnetic field and according to our best knowledge of the properties of the Earth's interior it should not be there at all ! In fact, investigation of the magnetic properties of different substances, such as iron and nickel, proves quite definitely that any trace of magnetisation must completely disappear as soon as these substances are heated above the so-called *Curie point*. Since the temperature inside the Earth reaches values, much above the *Curie point*, one can hardly expect that the observed phenomena can be explained as the result of permanent magnetisation.

In particular, the most natural hypothesis according to which the source of terrestrial magnetism is situated in the central iron core, can hardly stand up, because seismological evidence seems to show that this iron is completely molten."

(*Biography of the Earth*—p. 94)

(B) The Vedic View.

According to our study, the vedic scientist has tackled the problem in a different manner. From the

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Vedic stand-point, one thing is clear that the temperature of the earth's interior, at which the modern science has arrived, is speculative. In fact there is some subtle correlated working between the heat-waves in the interior of the earth and the electro-magnetic waves of the Maruts in the firmament, which is responsible for terrestrial magnetism.

This subtle problem needs further research.

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CHAPTER VII

The Planets and Comets

What is a Planet ?

The word *planet* literally means, the "wanderer" in Greek and the planets are so named, in contrast to the fixed stars, because, they travel across the sky, from asterism to asterism, following closely the path of the sun, called the ecliptic.

The band of the sky extending 8° north and south of the ecliptic, within which the planets move is known as the zodiac. There are twelve signs located in the zodiac and they are constellations named Aries (ram), Taurus (bull), Geminii (twins), Cancer (crab), Leo (lion), Virgo (virgin), Libra (scales), Scorpio (scorpion), Sagittarius (archer), Capricorn (unicorn), Aquarius (water carrier), Pisces (fishes).

(2) Birth of Planets and the Seven Primary Rays of the Sun.

In ancient Indian literature, there is absolutely no doubt about the fact that all the planets, moon and the asterisms are born out of the sun. It is clearly said,

ऋक्षचन्द्रग्रहाः सर्वे विज्ञेयाः सूर्यसंभवाः ।

(*Vayu Purana*, 50,99,53).

Modern science holds that moon is born out of the earth, but the ancient sages held that it took its birth out of the Sun.

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Adverting to the seven primary rays of the sun, it is believed that *Moon* is born out of the सुषम्णा ray of the sun or a group of rays known as सुषम्णा.

The planet *Mercury* with a surface temperature of 392°F is born out of the विश्वकर्मा ray.

दक्षिणे विश्वकर्मा तु रश्मिर्वर्धयते बुधम् ।

(*Vayu Purana* 53,47)

With a surface temperature of about 145°F, the planet *Venus* known as शुक्र, सित, उशना, भार्गव etc. is born out of the विश्वश्रवा group of solar rays.

विश्वश्रवास्तु यः पश्चात् शुक्रयोनिः स्मृतो बुधैः ।

(*Vayu Purana*, 53, 48)

The planet *Mars* is called भौम, लोहिताङ्ग, अङ्गारक, सुरसेनापतिः, स्कन्द etc. Its atmospheric temperature ranges from—40° to 77°F. It is born out of the group of solar rays called संपद्वसुः As is stated संपद्वसुश्च यो रश्मिः सा योनिर्लोहितस्य तु ।

(*Vayu Purana*, 53,48)

The planet *Jupiter*, known as सुराचार्य, देवाचार्य, गुरु-बृहत्तेज and जीव is born out of the group of solar rays called अर्वावसुः

cf. षष्ठस्त्वर्वावसु रश्मिर्योनिस्तु स बृहस्पतेः ।

(Ibid.)

It is yellowish having a diameter of 88,700 miles.

The planet *Saturn* which is known as सौर, अर्कपुत्र, छायासुत, असित, विरूप and यम is believed to be born out of solar rays called स्वराट्. The *Vayu Purana* 53,49 holds शनैश्चरं पुनश्चापि रश्मिराप्यायते स्वराट्. Saturn is almost as large as Jupiter and its surface temperature is—238°F.

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The Comets

The comets are another group of members of the solar system. In olden times they were looked upon as dreadful objects causing famine and pestilence but now with the advance of modern science, they do not look like very startling objects.

According to modern science, "they usually look like round clouds with a somewhat brighter centre. In contradistinction to planets, comets revolve round the sun in ellipses with high eccentricities. Their periods range between a few years and a few thousand years, and the total number of comets in the solar system is thought to be greater than a thousand. As a comet approaches the sun, its nucleus consisting of an immense number of small particles, is heated by the sun's rays and begins to exude gases (mainly hydrocarbons). The moment these gases leave the nucleus, they are acted upon by a strong force that drives them away from the sun-hence the notorious tail which generally points away from the sun."

(Karl Kiepenheur. *The Sun*, p.35)

The tails of the comets are formed by gases that are driven away by intense solar radiation.

The Vedic Reference to Comets:

There is a reference to the comet (धूमकेतुः) in *Rigveda* V, 11,3, which is addressed to the शुचिः rays of the sun. The *Rigvedic* text goes thus:

असंमृष्टो जायसे मात्रोः शुचिः
मन्द्रः कविरुदतिष्ठो विवस्वतः ।

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घृतेन त्वावर्धयन्नऽन आहुत
धूमस्ते केतुरभवद्दिवि श्रितः ॥

(*Rigveda* V,11,3)

Griffith translates it thus:

"Pure, unadorned, from thy two Mothers art thou born, thou Comet from Vivasvan as a charmin gsage. With oil they strengthened thee, O Agni, (Shuchi) worshipped God, thy banner was *the smoke that mounted to the sky*." (i.e. thy smoke became the Comet).

The Number of Comets

About the number of comets, there is a difference of opinion amongst the old Indian sages. According to Devala there are 108 comets as under :

आग्नेय	15	मृत्यु	4
रौद्र	21	माहेय	25
उद्दालकिसुत	10	सोमसंभव	3
काश्यपेय	14	वारुण	3
		यमपुत्र	13
	Total		108

देवलस्त्वाग्नेयाद्या नवविधा अष्टोत्तरशत केतवः ।
कृत्तिकादिषु त्रिषुनक्षत्रेषु स्थिता उदयन्ते इत्याह ॥

(*The Adbhutasagara* p. 152,1905 ed.)

According to Parashara, there are 101 comets, and according to modern science their number is more than a thousand. Although the astronomers are able to see about a dozen comets every year in their telescopes, yet the comets which attract world-wide attention are only two or three in a life long time.

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Halley's comet came in 1910 and is not due to return before 1986, according to Prof. Skilling (*Sun, Moon and Stars*, p. 158). And "many of the comets, probably all of them, come into view at regular intervals but most of them go so far out from the vicinity of the earth and the sun that it is many hundreds or thousands of years before they return." (*ibid.*)

It may be noticed in passing that a comet is different from the shooting star which dashes across the sky in one moment and is gone the next, but the comet, like the moon, remains in view, each night for days and weeks.

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CHAPTER VIII

The History and Scope of Chemistry in the Vedas

What is Chemistry ?

Chemistry is a branch of that science which consists in the study of the changes which matter is capable of undergoing. These changes may be either physical or chemical. In physical change there is no loss of substance and the property acquired is only temporary. For instance, rubbing of an iron on a piece of magnet in a definite way brings about a physical change.

In chemical change, there is an alteration in the composition of the substance-as a match box when burnt, produces carbon dioxide and water and thus undergoes a chemical change. In higher stages, it may be difficult to draw a distinction, for a chemical change presupposes a physical change. Chemistry is largely concerned with only those changes that occur when molecular structure of any substance is altered.

History and Scope of Vedic Chemistry.

Chemistry as Branch of Medicine :

Since vedic times in India, chemistry has been the hand-maid of medicine of which "the oldest literary monument is the *Atharvaveda*", according to Prof. Macdonell.

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In that close partnership, we find stupendous contributions made by chemists in the field of medicine, obviously within the compass of their own technique and equipment.

In ancient Hindu texts, we have lot of information on filtration, solution, crystallisation, distillation and sublimation (called ऊर्ध्वपातन) etc.

And all substances which now go by the name of oxides of copper or iron or zinc, and those known as the sulphates of iron and copper, gold amalgam, white lead, dyes with a large variety of vegetable products, were fully dealt with in the Hindu texts.

Not only medicine was associated with chemistry, but in ancient times *Astrology* had also something to do with chemistry inasmuch as the planets, Sun, Moon, Saturn, Jupiter, Mars, Venus and Mercury were associated with gold, silver, lead, tin, iron, copper and mercury and these metals were particularly in use in case of gem-therapy, copious references to which are available in the *Atharvaveda* and may be seen in the author's companion volume *Medicine in the Vedas*.

The historians record that even in Europe, until the Industrial Revolution, what chemistry was taught in the official seats of learning, was a branch of medicine. In his book *Modern Improvements of Useful Knowledge*, published in 1675, Geanvill wrote :

"Among the Egyptians and Arabians, the Paracelsians and some other moderns, chemistry was very phantastic, unintelligible and elusive. But its later cultivators

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and particularly the Royal Society, have refined it from its dross and made it honest and sober and intelligible.....for they have laid aside the delusory designs and vain transmutations, the Rosicrucian vapours, magical charms and superstitions and formed it into an instrument to know the depths and efficacies of Nature."

How the old designs in chemistry were understood and how they were transformed into the modern ways, will be clear from the observation by Lancelot Hogben, in his *Science for the Citizen* at p.392,

"Mercury combines with the yellow gas chlorine to form two different substances. One is the highly poisonous. corrosive sublimate (mercuric chloride) now used as an antiseptic for washing wounds. The other which contains twice the ratio of mercury to chlorine by weight is the purgative calomel (mercurous chloride). In an old chemical work written before the recognition that air has weight, the information of the calomel by grinding crystals of corrosive sublimate with the liquid metal itself was described by the statement, '*the fierce serpent is tamed, and the dragon so reduced to subjection as to oblige him to devour his own tail.*'

The words will not appear to be pure rhetoric, if we recall the expedients employed to make the supposedly imponderable *spirits* pass out of the air into the ingredients of the retort. Ancient numerical magic had associated the seven best known metals with the seven bodies, classified as planets in the precopernican astronomy ; the sun with gold, the moon with silver, Mercury with mercury, venus

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with copper.,Mars with iron, Jupiter with tin, and Saturn with lead.

Success in conjuring the spirits which presided over chemical processes in which these metals formed compounds, or were extracted from their compounds, was not to be expected unless the experiment was carried out when the appropriate celestial body was making its transit above the meridian. The various conjunctions of the several planets offered specially propitious circumstances for carrying out reactions in which different metals participated."

Chemistry in Egyptian Literature.

Hermes also was a great poet and philosopher and the ruler of Egypt. His precepts were engraved on an emerald stone, and as Dr. F. J. Moore observes, "The emerald tablet is not really chemistry but represents a doctrine of cosmology which was very much like certain Chinese theories and had to do with the action of the Sun (Sulphur) and the Moon (Mercury). Later workers read alchemical ideas into it and in alchemical literature some 36000 writings have been attributed to Hermes.

The main end of alchemy was the search for the *elixir* and the philosopher's stone. These were assumed to have the power of creating eternal youth and would turn base metals into gold". (*A History of Chemistry* p.3)

Chemistry in Arabia.

The Arabians learnt the science of chemistry from the Hindus and it is recorded that Jabir Ibn Hayyan, a Doctor of chemistry, who lived in Arabia in the 8th century A. D. knew "white arsenic, borax, common salt,

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alum, copper (ferrus sulphate) and possibly sulphuric, nitric and acetic acids. The apparatus used by him was similar to that used until the eighteenth century."

(*Everyman's Encyclopedia*, Vol. III-p.656)

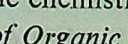
Modern Chemistry

Modern chemistry starts with Robert Boyle (1627-91), the father of chemistry who introduced for the first time the definition of an element in his famous work *Sceptical Chemist* and refuted the theories of the alchemists regarding salt, sulphur and mercury as the elements of substances.

Further advances were made by Bechar with his phlogiston theory of combustion, by Priestley with his discovery of oxygen, Lavoisier and Cavandish Richter (1762-1897), Berzelius (1770-1848), Faraday (1791-1867), Bunsen (1811-99) and the French scientist M. Berthelot with his monumental work on the chemistry of the middle ages, of Arabia and Syria, and host of others who made remarkable studies both in organic and inorganic chemistry.

According to Prof. Schorlemmer, "Upto the 16th century, almost the sole object of chemical research had been to find the *philosopher's stone*, but now chemistry began to develop itself into two new and different paths, opened by two distinguished men-Agricola, the father of metallurgy and Paracelsus, the founder of Latro-chemistry or medical chemistry. Both contributed chiefly to the development of inorganic chemistry....."

(*Rise and Development of Organic Chemistry*, p. 9.)



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CHAPTER IX

The Vedic Chemistry of Gold and Gems

Gold in Vedic Chemistry

According to Prof. Moore, the science of chemistry has been regarded as the outcome of man's attempt to make gold and to explain its occurence.

In China and in Egypt, gold was regarded as a magic medicine from very old times. In India we have references to gold as a miracle-cure for many ailments, in the *Atharvaveda XI*, 1,28

इमं मे ज्योतिरमृतं हिरण्यम् ।

"This gold is my immortal light." The Hindus like the Chinese associated medicinal gold with longevity or even immortality.

There is abundant evidence of alchemy in Europe even before the eighth century. Alchemical reasoning was deductive and based on the assumption that all matter resulted from the combination or interaction of two first principles and on the existence of a transmuting agent which was known, under many names, such as philosopher's stone, elixir vitae, grand magisterium, magistery or elixir, red tincture. All matter was alike in being composed of an active constituent and a sluggish one. Mercury and Sulphur were often regarded as these constituents.

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2) Chemistry of Gold and Shell in the Atharvaveda.

We have several references to the alchemy of shell and gold in the *Atharvaveda* and in this connection, the following hymns are worthy of note :—

1. *Atharvaveda* IV, 10, 1 says.

वाताज्जातो अन्तरिक्षाद्
विद्युतो ज्योतिषस्परी ।
स नो हिरण्यजाः शङ्खः
कृशनः पात्वंहसः ॥

Born in the heavens, born in the sea brought on from the river, this shell born of gold, is our life-prolonging amulet.

(*Atharvaveda* IV, 10, 1)

2. *Atharvaveda* IV, 10, 7 says.

देवानामस्थि कृशनं बभूव
तदात्मन्वच्चरत्यप्स्वन्तः ।
तत् ते बध्नाम्यायुषे
वर्चसे बलाय दीर्घायुत्वाय
शतशारदाय कार्शनस्त्वाभि रक्षतु ॥

The bone of the gods turned into pearl that animated, dwells in waters. That do I fasten upon thee unto life, lusture, strength, longevity, unto a life lasting a hundred autumns. May the amulet of pearl protect thee !

(*Atharvaveda* IV, 10, 7)

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3. *Atharvaveda* XIX, 26, 1 holds :

अग्ने प्रजातं परियद्धिरण्यममृतं दध्रे अधि मर्त्येषु
य एनद् वेद स इदेनमर्हति
जरामृत्युर्भवति यो बिभर्ति ॥

The gold which is born from fire, the immortal they bestowed upon the mortals. He who knows this deserves it, of old age he does not die who wears it.

(*Atharvaveda* XIX, 26, 1)

4. *Atharvaveda* XIX, 26, 2 holds :

यद्धिरण्यं सूर्येण सुवर्णं प्रजावन्तो मनवः पूर्वे
ईषिरे । तत् त्वा चन्द्रं वर्चसा सं सृजत्यायुष्मान्
भवति यो बिभर्ति ॥

The gold endowed by the sun with beautiful colour which the men of yore, rich in descendants, did desire; may it gleaming envelop thee in lustre. Long lived becomes he who wears it.

(*Atharvaveda* XIX, 26, 2)

5. *Atharvaveda* XIX, 26, 3 holds :

आयुषे त्वा वर्चसे त्वौजसे च बलाय च
यथा हिरण्यतेजसा विभासासि जनाँ अनु ॥

"May it envelope thee unto long life, unto lustre, unto force and unto strength, that thou shalt by the brilliancy of the gold shine forth among people."

(*Atharvaveda* XIX, 26, 3)

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6. *Atharvaveda* XIX, 26, 4 holds :

यद् वेद राजा वरुणो वेद देवो बृहस्पतिः ।
इन्द्रो यद् वृत्रहा वेद तत् त आयुष्यं भुवत् ।
तत् ते वर्चस्यं भुवत् ॥

The gold which king Varuna knows, which god Brihaspati knows, which Indra, the slayer of Vritra knows, may that become for thee a source of life, may that become for thee a source of lustre.

(*Atharvaveda*, XIX, 26, 4)

(3) Soma-Juice Filtration in Vedic Chemistry.

The ancient civilizations in India, Egypt, Greece or Rome were familiar with metals and their extraction from ores. They also knew how to make alloys, particularly of copper, lead and tin.

These ancient people were quite familiar also with the manufacture of soap, starch, glass, leather, stoneware, wine and bear *cf.* शतं कुम्भां असिञ्चतं सुरायाः (*Rigveda* I, 116, 7) *filtered* hundred pitchers of wine.

The chemical composition of Somalata-the famous herbal tonic of the gods, was well known and its decoction in सोमरस which gave health and longevity, was quite well known to the Indian vedic sages. The entire Ninth Book of the *Rigveda* with all its depth and sublimity is in praise of that *Soma* and is known as *Pavamana-Soma-sukta* (the hymn of the pure Soma).

The vedic sages were familiar with the process of distillation, and went into ecstasy over the exhilirating effects

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of the fermented soma juice. Mark the hilarity of the sage marching to the filter, with spirited buoyancy, in *Rigveda*-X, 97, 1

या ओषधीः पूर्वा जाता
देवेभ्यस्त्रियुगं पुरा ।
मनै नु बभ्रूणामहं
शतं धामानि सप्त च ॥

(4) Makara-Dhvaja and Vedic Chemistry.

In the domain of chemistry of gold, we find that the preparation of *Makara-Dhvaja* is a landmark in the history of ancient Hindu chemistry. It is a celebrated medicine which was known as a panacea for all ills. This is prepared by taking one part by weight of gold leaves which are triturated with eight parts of mercury. A uniform paste is thus formed. Adding 16 parts by weight of sulphur to this amalgam, the mixture is triturated in a mortar and pastle to obtain a black mass, etc. On the addition of sulphur, the excess of mercury combines with sulphur to form a black sulphide. After heating, the excess of sulphur goes off and the sulphide of mercury formed, gets sublimated to give a dark red coloured substance. Gold combines with mercury to give amalgams Au_9 Hg, Au_8 Hg, Au_3 Hg, Au_2 Hg, etc.

The entire process of preparation of *Makara-Dhvaja* is not carried under reduced pressure, and the chemist must suitably study the conditions of temperature and pressure. The maximum amount of sulphur in this gold preparation is six times the weight of mercury employed. (षड्गुण गन्धक जरित).

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The chemical formula of mercury sulphide HgS indicates the amount of sulphur as a little less than 1/6th of the amount of mercury.

Let us examine its formula given in an ancient text *Rasendra Chintamani*. "When quicksilver is killed with an equal weight of purified sulphur it becomes hundred times more efficacious. When it is killed with twice its weight of sulphur it cures leprosy. When it is killed with thrice its weight of sulphur, it cures mental langour; when it is killed with four times its weight of sulphur, it removes grey hair, and wrinkles; when it is killed with five times its weight of sulphur, it cures consumption and when it is killed with six times its weight of sulphur it is a panacea for all the ills that flesh is heir to."

6. The Vedic Chemistry of Gems

In the domain of chemistry, the gems are helpful in the coagulation of mercury. These are

वैक्रान्त resembles a diamond
सूर्यकान्त sunstone (lens)
हीरकम् diamond
चन्द्रकान्त moon stone (not known now)
रजावर्त lapis Lazauli
गारुत्मतम् emerald

topas, the sapphire, the coral, the cat's eye are also taken as gems.

The Vedas speak of a place illuminated by rubbies, and diamonds which gave out light as refulgent as that of the planets.

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CHAPTER X

The Vedic Chemistry of Metals

Vedic Chemistry and Metallurgy.

The use of metals in the Vedas is frequently found. Gold, silver, copper and iron are used in medicines and for coats of arms etc. Iron was called कृष्णायस or the black metal and copper was called लोहितायस or the red metal. हरित (yellow) was the name given to the gold, and रजत् (white) was the name by which silver was called. For example, *Atharvaveda* V, 28, 1 refers to these metals thus :

नव प्राणान्नवभिः सं मिमीते
दीर्घायुत्वाय शतशारदाय।
हरिते त्रीणि रजते त्रीणि
अयसि त्रीणि तपसाविष्ठितानि ॥

Atharvaveda XI, 3, 7, similarly refers to the various metals being used in vedic period.

श्याममयोऽस्य मांसानि
लोहितमस्य लोहितम् ॥

The *Yajurveda* XVIII, 13, makes references to these metals for fulfilment of sacrifices.

हिरण्यं च मे ऽयश्च मे
श्यामं च मे लोहश्च मे ।
सीसं च मे त्रपु च मे
यज्ञेन कल्पन्ताम् ॥

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In the Upanishads, the metallurgical skill of the ancient Hindu sages is evident in a passage of the Chhandogya Upanishad in which the qualifications of ब्रह्मा, the supervisor of the Sacrifice, are enumerated :

तद्यथा लवणेन सुवर्णं
सं दध्यात् सुवर्णेन रजतं
रजतेन त्रपु त्रपुणा सीसं
सीसेन लोहं लोहेन दारुं
दारुं चर्मणा ।

"As gold is corrected by borax, and silver by gold, and tin by silver and lead by tin, and iron by lead and wood by iron or leather-so doth the majesty of these regions of these gods and of these three systems of knowledge, correct the improprieties of the sacrifice. That sacrifice becomes efficacious of which the Brahma is conscient of all this."

Foreigners have eloquently admired the *art* of the Indians in Metallurgy. Megasthenes writes, that the Indians were 'well skilled in the arts." According to Fergusson, the Kutab minar of Delhi opens our eyes to an unsuspected state of affairs to find the Hindus at that age capable of forging a bar of iron larger than any that have been forged even in Europe upto a very late date and not frequently even now. .....It is almost equally startling to find that after an exposure to wind and rain for fourteen centuries, it is unrusted, and the capital and inscription are as clear and as sharp now as when put up fourteen centuries ago."

(*History of Indian and Eastern Architecture*, p. 508)

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(2) Use of Lead in the Vedas.

Lead was an important metal to dispel disease and was in use by the alchemists in the vedic period.

A hymn in praise of lead is given in the *Atharvaveda.*

"To the lead, Varuna gives blessing, to the lead Agni gives help. Indra gave me the lead-unfailingly it dispels disease."

सीसायाध्याह वरुणः सीसायाग्निरुपावति
सीसं म इन्द्रः प्रायच्छत् तदङ्ग यातु चातनम् ॥

(*Atharvaveda* I, 16, 2)

(3) The Killing of Metals.

The preparation of *Bhasma* in which the metal mineral is subjected to a purification treatment and differential thermal analysis is an old feat of Hindu chemistry. The red hot metal is plunged into liquids like butter-milk, sour gruel, cow's urine (गोमूत्र), sesamum etc, Later, the metal is *killed,* and converted into ashes, to be used as medicinal tonic. Such a *Bhasma* conforms to the following tests :

(a) *Nishchandra Katava* : there should be no shining particles left. This is done with the naked eye.

(b) *Rekhapurnatva*–the test is conducted by rubbing the powder in between the thumb and the finger and it enters the fine lines on the thumb and the finger.

(c) *Vari-taram*–The chemist will see that the powder floats on the water surface when sprinkled on the surface of water.

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(d) *Colour test*—The chemical expert ensures that the powder yields the following colours.

Gold=like that of champak flower.
silver=black.
copper=black.
bell-metal=light blue colour of fog.
lead=like that of a pigeon.
tin = white
iron = like that of a "Jambu" fruit
mica = brick colour

These four are the physical tests. Then there are *chemical tests*, out of which the most important is the अपुनर्भव test which implies that the powder which when heated with jaggery, powdered seeds of Abrus Precatorius, borax, honey and ghee, does not get converted into the original substance.

4. Post-Vedic Chemistry in India

The *Rasarnava*, a tantra of the Saiva Cult, is chronologically the earliest of the extant works on Metallurgy. It is profusely quoted and read by Vagabhatta in his *Rasendra Sara Samgraha*.

In fact the *tantras* are the repositories of chemical knowledge, dealing with the compositions of parada (quicksilver) mica, in beautiful dialogues between Hara and Gauri. The deadening of mercury is described in a stage when there is no "wetness, thickness, brightness, heaviness and mobility."

(b) There is a regular science of mercury developed as a branch of chemistry in ancient India.

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Iron and Mercury are mentioned as aphrodisiacs and tonics by Varahamihira (587 A.D.). There were several preparations of iron, copper, mercury and other metals which were utilized in medicine.

(c) The knowledge of practical chemistry was vast in the 12th century.

The colour of flames as a help to diagnose metals was very well known in India-long before the knowledge could spread to Europe. Charaka and Sushruta give us a complete Hindu Pharmacopia.

The preparation of caustic alkali is given in Sushruta; white oxide of arsenic, specialisation in mercurial remedies, and internal administration of metals are so carefully given in Sushruta.

Buddhist period was studded with hospitals and ayurvedic pharmacies. Indian physicians practised at the court of Baghdad.

(d) Black sulphide of mercury (कज्जलि:), sulphides of copper, rust of iron, recipe for a soap to be used as a depilatory, powder of copper compound, extracting zinc from calamine, colouring of metals, killing of iron, mercury, copper etc. and their tests are found detailed in the *Siddha yoga* of Vrinda and Chakrapani and in the various tantras like *Rasarnava*.

Rasa meant mercury in the oldest ayurvedic literature and was one of the four in mineral kingdom viz.,

रस mercury

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उपरस the inferior rasas e.g. Sulphur, red ochre, vitriol, alum, orpiment, anjana etc.

रत्न gems

लोह metals

In Charaka, Sushruta, the *rasa* means fluid, and the *rasa kriya* means concentrated decoction. *Rasayana* refers to a medicine which prevents old age and prolongs life-later on it was exclusively meant to relate to the use of mercury and other metals in medicine and at present it means also alchemy (chemistry).

(e) There were several medical treatises which must have been composed between the period of *Atharvaveda* and that of Charaka. Even at the time of Charaka, there were existing monumental works by mighty authors, like Agnivesa, Bhela, Jatukarna, Parasara, Harita, Ksharapani. Charaka followed for his basis the work of Agnivesa, which was remodelled and rearranged by him.

Since the days of Vagabhatta, metallic preparations had begun slowly to creep into use, and at the time of Chakrapani, their use was fully established.

From the tenth century and downward, every medical work more or less recommends compounds of metals which can only be synthetically prepared.

(f) The *Sushruta Samhita is par excellence* a treatise on surgery and for a description of the ancient surgical instruments one may advert to "*Commentary on the Hindu System of Medicine*" by Wise.

In the earliest Buddhist literature, for example, in the

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chapter on *Medicaments* in *Mahavagga* we find several references to chemistry in relation to medicine.

Recipe for Gunpowder

(g) Gun powder was manufactured in ancient India and we have several recipes given in ancient works in Sanskrit. For instance, the *Shukra-niti* stanzas 201-202 state the formula thus :

Take five palas of saltpetre, one pala of sulphur and one pala of charcoal prepared from the wood of calotropis gigantea and Euphorbia nerifolia, by destructive distillation, powder them and mix them intimately and macerate them in the juice of the above-named plants and of garlic and afterwards dry the mixture in the sun and pulverise it to the fineness of sugar. Gunpowder is thus obtained. If the fine powder is to be used for a gun, six or four palas of saltpetre are to be taken, the proportion of charcoal and sulphur remaining the same.

Agni Purana, a more ancient work does not make any mention of the use of gunpowder in India. It is therefore, believed by some scholars that during the Moslem period of warfare, the gun powder was brought into use in India. Fire missiles, called *agni astra* were often used. सौवर्चल is the name used for saltpetre. The distillation of alum is commonly referred to in the ancient chemico-medical literature of India and also preparation of mineral acids, which were called द्रावक (solvent).

(h) Sulphuric acid, known as *gandhak ka attar* was known in India for centuries, and for nitric acid, as Sir W.O. Shaughnessy writes, the clumsy formula was thus used;

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Take of saltpetre 20 parts

take of alum 16 parts

take of the acid liquid from the leaves and stem of the Bengal horsegram, 18 parts. Mix and distil with an increasing heat till the whole of the acid is condensed in a receiver.

(i) In his *Manual of Chemistry* he further cites a recipe for Nitric acid thus:

Take of common salt 8 parts

Take of alum 6 parts

and take the acid liquid from the horsegram and distil with an increasing heat till the whole of the acid is condensed in a receiver.

The Chemical Tests in Ancient India

(j) The following arts (known as कला) were prevalent in India in ancient times. Vatsyayana's *Kamasutra* refers to 64 kalas and mentions the following, which are of interest to the student of chemistry.

सुवर्ण रत्न परीक्षा testing of gold and gems

धातुवाद metallurgy

मणिरागाकरज्ञानम् knowledge of the colouring of gems and jewels, the art of alloying and separating the metals, the art of extracting alkali, combining metals and herbs and plants. The sanskrit name for a metallurgist was धातु विद् or लोह विद् . Paittala is an alloy of copper and zinc; Zinc being amalgamated with mercury gives rise to rasaka (mineral calamine).

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(k) Pure gold is to be alloyed with one hundred times its weight of copper and this imitation of gold will resemble native gold.

The *Swarna tantra* makes a mention of it thus, "A kind of oil is exuded from the bulbous root of a plant; all around it within a radius of ten cubits, only water is exuded and a venomous snake lives under it. If you want to test the properties of the bulb you should thrust a needle into it and the needle at once dissolves. Having procured this bulb, rub it with mercury in a mortar and add the oil and subject the mixture to a heat in a crucible. The mercury is at once *killed* and acquires the property of converting one hundred thousand times its own weight of the base metal into gold." [14-18]

(l) The *Garuda Purana* has several chapters devoted to रत्नपरीक्षा *testing of gems*. According to P.C. Ray, "The typical chapters which were most relied upon for differentiating one species of a gem from another were

(1) the relative weight

(2) hardness

(3) lustre, transparency and colour

(4) fusibility, especially when heated in combination with the alkalies. It will be noticed that even the lapidarists and the mineralogists of the present day have to depend largely upon these properties in the classification of the stones."

(*History of Hindu Chemistry*, Vol. II, p. 32)

Phosphorescence of Diamond

(m) It is asserted by western scientists that the

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phosphorescence of diamond was first observed in 1663 A.D. by the celebrated Robert Boyle but this property of the diamond was already known to the Indians. As P.C. Ray has observed, Bhoja (11th century A.D.) mentions this property, *cf.* अन्धकारे च दीप्यते (phosphoresces in the dark) (*History of Hindu Chemistry*, vol. II p. 40)

(n) The process of rendering mild alkali caustic by the addition of lime is to be found in Chakrapani (1050 A. D.). There is a mention of the cauterisation of lead wounds by means of caustic alkali in a Buddhist work. viz, *The Questions of King Milinda* and the process is stated in the following words,

"And when the inflammation had gone down, and the wound had become sweet, suppose he were then to cut into it with a lancet and burn it with caustic. And when he had cauterized it, suppose he were to prescribe an alkaline wash.....Now tell me, O king, would it be out of cruelty that the surgeon.....thus cut with the lancet and cauterized with the stick of caustic."

(*Sacred Books of the East Series*, Vol. XXXV, p. 168)

(o) The *Qualitative test for metals* in their identification by means of colouration of flames is a unique contribution of the ancient Hindu chemistry. It was known that 'copper yields a blue flame...that of the tin is pigeon coloured; that of the lead is pale-tinted. (*Rasarnava*)

(p) The *Charaka* and *Sushruta* schools of medicine have copious references to the preparation of chemical compounds and Patanjali's *Lohashastra* is a monumental work on Hindu metallurgy and narrates several processes

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for the preparation of metallic salts and alloys and their purifications. The tampering of steel, a process of advanced metallurgy was already known to the Indians.

Varahamihir's बृहत्सँहिता (6th century A.D.) refers to वज्रलेप powders or cements which are as strong as the thunderbolt and which was used In Buddhist temples. He also refers to the experts in machinery यन्त्रविद: and dyeing experts (रागगन्धयुक्तिविद:).

Chapter 76 of that book is devoted to perfumery and scents prepared artificially from natural flower scents.

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APPENDIX

Contributions of Ancient India in the field of Physics and Chemistry

"Ancient Indian ideas of physics were closely linked with religion and theology, and differed somewhat from sect to sect. As early as the time of the Buddha if not before, the universe was classified by elements, which all schools admitted at least four: earth, air, fire and water. To these orthodox Hindu schools, Jainism added a fifth, *akasha*, which is generally translated as "ether". It was recognized that air was not of infinite extension, and the Indian mind, with its abhorrence of a vacuum, found it hard to conceive of empty space. The five elements were thought of as the mediums of sense impressions, earth of smell, air of feeling, fire of vision, water of taste, and ether of sound. Buddhists and Ajivikas rejected ether, but the latter added life, joy and sorrow, which were thought of as in some way material, making a total of seven elements.

Most schools believed that the elements other than ether were atomic. Indian atomism was certainly independent of Greek influence, for an atomic theory was taught by Pakudha Katyayana, an older contemporary of the Buddha, and was, therefore, earlier than that of Democritus. The Jainas believed that all atoms (anu) were identical, and that difference of the character of the elements was due to the manner in which the atoms were

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combined. Most schools, however, maintained that there were as many types of atom as there were elements.

The atom was generally thought to be eternal, but some Buddhists conceived of it not only as the minutest object capable of occupying space, but also as occupying the minutest possible duration of time, coming into being and vanishing almost in an instant, only to be succeeded by another atom, caused by the first. Thus the atom of Buddhism in some measure resembles the quantum of Planck. The atom was quite invisible to the human eye ; the orthodox Vaisesika school believed the single atom to be a mere point in space, completely without magnitude.

A single atom had no qualities but only potentialities, which came into play when the atom combined with others. The Vaisesika school, which specially elaborated atomic doctrines, and was the school of atomism *par excellence* maintained that, before combining to form material objects, atoms made primary combinations of diads and triads. This doctrine of molecules was developed differently by Buddhists and Ajivikas, who taught that in normal conditions no atoms existed in a pure state, but only combined in different proportions in a molecule (samghata, kalapa). Every molecule contained at least one atom of all four types, and obtained its character from predominance of a given element. This hypothesis accounted for the fact that matter might show characteristics of more than one element : thus wax might melt and also burn, because its molecules contained proportions of water and fire. According to the Buddhists, the molecules cohered, by virtue of the atoms of water in each case which acted as adhesive.

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Indian atomic theories were not, of course, based on experiment, but on intuition and logic. They were not universally held. The great theologian Sankara did not believe in atoms and argued strongly against their existence. *But the atomic theories of ancient India are brilliant imaginative explanations of the Physical structrue of the world;* though it is probably mere coincidence, that they agree in part with the theories of modern physics, they are nevertheless much to the credit of the intellect and imagination of early Indian thinkers.

Beyond this, ancient Indian physics developed little. Without knowledge of an all-embracing law of gravity it remained in a rudimentary state, like all the physical systems of the ancient world. It was generally believed that the elements of earth and water tended to fall, and fire to rise, and it was recognized that solids and fluids alike generally expanded on heating, but no serious effort was made to study such phenomena experimentally. In the science of acoustics, however, India made real discoveries based on experiment, and the ear, highly trained by the phonetic study necessary for the correct recitation of the Vedas, learned to distinguish musical tones far closer than those of other early musical systems. Before the Christian era the octave was divided into twenty-two srutis, or quartertones, and their proportions were measured with great accuracy. It was recognized that differences of timber were caused by overtones (anuranava), which varied with different instruments.

We know from the evidence of the Iron Pillar of Delhi and other sources that Indian metallurgists gained

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We know from the evidence of the Iron Pillar of Delhi and other sources that Indian metallurgists gained

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great proficiency in the extraction of metal from ore and in metal-casting, and their products were known and valued in the Roman Empire and the Middle East ; but their knowledge appears to have been largely pragmatic, and had no counterpart in a highly developed science of metallurgy. Chemistry in ancient India was the handmaid, not of technology, but of medicine ; her chemists did not share the interest of medieval Europe in transmuting base metal into gold, but apparently devoted most of their attention to making medicines, drugs to promote longevity, aphrodisiacs, poisons, and their antidotes. These medical chemists did succeed in producing many important alkalis, acids and metallic salts by simple processes of calcination and distillation, and it has even been suggested, without good basis, that they discovered a form of gunpowder.

In the Middle Ages, Indian chemists, like their counterparts in China, the Muslim World and Europe, became engrossed in the study of mercury, perhaps through contact with the Arabs. A school of alchemists arose, who experimented with the wonderful fluid metal, and decided that it was the specific for all diseases, the source of perpetual youth, and even the surest means to salvation. In this infatuation with mercury, Indian chemistry foundered, but not before it had passed many ideas on to the Arabs, who gave them to medieval Europe."

(A.L. Basham—*The Wonder That was India*—p. 497 ff.)

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Book II

The Science of Mathematics

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INTRODUCTION

Speaking about the cultural heritage and contribution of India to world thought, Manu proclaimed,

एतद्देशप्रसूतस्य सकाशात् अग्रजन्मनः
स्वं स्वं चरित्रं शिक्षेरन् पृथिव्यां सर्वमानवाः ॥

(*Manu. II, 20*)

'From a Brahmana, born in this country (India), let all men on earth learn their several usages.'

(Buhler—*The Laws of Manu*)

In the same strain, paying an apt tribute to the ingenuity of vedic seers, Max Muller said in '*India, What can it Teach us*', "If I were asked under what sky the human mind has most fully developed some of its choicest gifts, has most deeply pondered on the greatest problems of life and has found solutions of some of them which will deserve the attention even of those who have studied Plato and Kant, I should point to India"

This treatise 'Mathematics in the Vedas' is an attempt to acquaint the readers with the contribution of the Vedas in the field of Mathematics.

I have confined myself strictly to the citations from the Samhita texts and have not dwelt on the development and history in the post-Vedic period. A vast literature on Mathematics is available in the monumental works ranging from the Sulba Sutras of Baudhayana (800 B.C.) to the 12th century of Mathematician Bhaskara. All this is a growth and development of the nucleus that we find in the

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Samhita texts, and which I have tried to collect and place before the readers.

I am aware that there are very subtle and quick methods of finding out the results of long multiplication tables and several other miraculous formulae in the 52 ancilliary treatises of the *Atharva veda* known as अथर्ववेद परिशिष्ट edited by George Melvile Bolling and von Negelein but since some of them lack lucidity and universal application and are otherwise also outside the range of my treatise, which is confined only to the Samhita text, I have refrained from alluding to them.

While tracing out the history and development of Hindu Algebra, I have indicated that the Arabians came into the field of Mathematics only in the 8th Century A.D., whereas Indian mathematicians were working out these problems right from 8th Century B. C. in the Sutra Period. Mathematics was called by the Arabs as *Ilme Hindasa* which literally means, knowledge from Hind (India) and was later popularly understood as the knowledge of *digits*. The common notion that the word *Zarb* which means 'strike' and is a synonym for "multiplication" is taken from foreign source, is erroneous, inasmuch as the original word for "multiplication," already in use in India, is घात which means 'strike'.

The following example from *Lilavati*, a work by Bhaskaracharya (on which many mathematicians have exerted in commenting and which was translated into Persian in A.D. 1587 under orders of Akbar, the Moghul Emperor) will show how the word घात which later came into vogue as 'Zarb' in Arabian literature was derived and used.

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कः पञ्चनिघ्नो विहृतः त्रिषष्ट्या
सप्तावशेषो ऽथ स एव राशिः।
दशाहतः स्यात् विहृतः त्रिषष्ट्या
चतुर्दशाग्र्यो वद राशिमेनम् ॥

(*Lilavati–266*)

"What quantity is it which multiplied by five and divided by 63, gives a residue of 7 and the same multiplied by ten and divided by 63, a remainder of 14. Declare the number."

Another name was हत which also means "struck"–"multiplied."

Similarly for Greek contribution. It is contested by some scholars that the late Hindu mathematical works contain the words *Kona* from a Greek root, meaning angle and *Trikona*, from Greek root meaning, triangle, but it must be carefully considered here, that in *Sulba Sutras* which are more ancient works, we have the vedic Sanskrit word प्र-उग Prauga for a 'triangle'. As regards the word *Lipta* to which Dr. Keith has alluded in his *History of Sanskrit Literature,* there is a pure Sanskrit word Kala कला used by the Hindus (*Vide Maitrayani Samhita* III, 7, 7, cited infra).

There is thus no force in the argrument that because certain Greek terms in Hindu Mathematics are used by later scholars, the old Hindu writers on astronomy and mathematics had no corresponding terminology.

As Dr. Bina Chatterjee affirms it: "the trigonometri-

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cal ratio of "Sine" is unknown to Ptolemy, whereas the Hindus make constant use of it."

(*Journal of the Royal Asiatic Society of Bengal* Vol. XV, No. 2, 1949–article on *Hindu Astronomy*).

As B.K. Sarkar observes : "The mathematicians of India devised (1) the table of sines and (2) the table of versed sines. The term sine is an Arabic corruption from Sanskrit Shinjini."

(*Hindu Achievements in Exact Sciences*-p. 20)

"Bhaskaracharya anticipated Newton (1642-1727) by over five hundred years in the discovery of the principles of differential calculus."

(*Ibid.* p 23)

"Even before the Arabians could become acquainted with Ptolemy, Brahmagupta who holds a remarkable place in the history of Eastern Civilization, taught the Arabs, astronomy."

(Alberuni's *India*, Vol. 2, p. 304)

"According to Appolonius, Pythagoras had come to India where he had been instructed by the Brahmins."

(*Life After Death*, Swami Vivekananda–p. 21)

This treatise is divided into four chapters. The first deals with the technique of Vedic interpretation

Admiring the philological and etymological approach and understanding of the vedic seers in dealing with the vedic terms and names, Aurobindo Ghosh writes : "We moderns use words as counters without any memory or appreciation of their original sense; when we speak, we think of the object spoken of—not at all of the expressive

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word which is to us a dead and brute thing—mere coins of verbal currency with no value of its own, our words are carefully limited to one or two senses, theirs were capable of a great number and it was quite easy for them, if they so chose to use a word like Agni, Varuna or Vayu as a sound indeed of a great number of connected and complex ideas—a key word." "It cannot be doubted," he continues, "that the Vedic Rishis did take advantage of this greater potentiality of their language—note their dealings with such words as gau (गौ) and chandra (चन्द्र). The Nirukta bears evidence to this capacity and in the Brahmanas and Upanishads, we find the memory of this free and symbolic use of words still subsisting."

(*Dayananda and the Veda*, p. 57).

This is a glowing tribute to the subtle and comprehensive command of the vedic seers over the different meanings of the vedic terms. The word (गौ) has 47 different meanings in the vedic usage, but the vedic seer is conversant with its connotations in a multifarious aspect and sequence of thought, so has the word पृथ्वी (earth) 21 synonyms and there are 30 synonyms for मेघ (cloud).

Trita, mythologically may be a proper name of a sage but in the context of mathematics, may be taken as the ratio, one third, with reference to a well-a cylinder, the Geometrical figure which encompasses it. (vide *Rig Veda* I, 105, 17). So in terms of mythology, Mitra may be the name of the deity, but in the context and exposition of science, it may be oxygen and its connection with Varuna, the mythological god, but scientifically termed as Hydrogen, will produce 'Apsarsa' water, in a formula H_2O. This subject will be treated in another series dealing with 'Science and Technology in the Vedas.'

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Injustice has been done to Vedic interpretation, when the orientalist of the modern age has lost sight of the variety of meanings and their application in different contexts, translating for example, (गौ) only as 'cow' *everywhere* and distorting translations to the utter deterioration and debasement of ancient Indian culture. This subject will be comprehensively dealt with in another series, when we are critically examining some vedic translations by Western Indologists. In fact, it may not be too much to say that the acids of modernity have dissolved the adjustment of the old traditions of the Vedic seers.

Chapter second deals with the purpose and character of Mathematics in the Vedas. The pertinent question arises, why in the vedas, which are the so-called religious prayers of the Aryans, this subject has been introduced. It has to be clearly understood, that the Vedas are the repository of all *branches* of knowledge, Science, Art and Philosophy which have been developed in the world through comprehensive expositions in the *Brahmanas* and are not merely a ritual liturgy or a collection or hymns of prayers to this god, or that, fumbling ultimately to find as Macdonell feels "to know to what god should we offer worship." *cf.* कस्मै देवाय हविषा विधेम । (*Rig. X, 121*)

Taking up original references from the Samhita texts, the third chapter deals with interesting material, sufficient to arouse the awe and curiosity of the ordinary students and the advanced teachers of mathematics, who had no occasion to trace things to original sources and are accustomed to quite a different atmosphere of thought. in schools and colleges.

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The practical utility of Mathematics in day to day working was considered an essential feature to be incorporated in this treatise and has been, accordingly, introduced in the fourth chapter dealing with "Mathematical Reflections on Human Life."

It is fervently hoped that this treatise will prove a rich incentive to the intelligent seekers after Truth about the cultural heritage of the Indian mind, particularly in this era of Post Independent India in which educated opinion has to be mobilized to examine the excellence of all that oriental genius has enshrined in the Vedas.

New Delhi
March 7, 1959.

Dharma Deva Mehta

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CHAPTER I

The Vedas and the Technique of Vedic Interpretation

The profundity and vastness of the Vedic religion and literature are conceded by all Oriental scholars; and as W. D. Brown testifies in *The Superiority of the Vedic Religion*, "It (the Vedic religion) is a thoroughly scientific religion where religion and science meet hand in hand. Here theology is based upon science and philosophy."

The Vedas are the repository of all knowledge, "the institution of a time-less revelation and a divine truth given to humanity," in the words of Shri Aurobindo. They are the root-approach to all Dharma, as Manu puts it, (वेदोऽखिलो धर्ममूलम्, Manu, II. 6) and the gateway to the discovery of knowledge. Shri Aurobindo Ghosh rightly paid the tribute to Dayananda, the great Vedic savant and commentator, (whose incessant cry was "Back to the Vedas"), in these words. "In the matter of Vedic interpretation, I am convinced, that whatever may be the final complete interpretation, Dayananda will be honoured as the first discoverer of the right clues." (*Dayananda and the Veda*) p.60

What is Veda?

Veda primarily signifies "knowledge" from *vid* to know, and designates sacred lore, revealed by God, to the consciousness of the sages, Agni, Vayu, Aditya and Angirasa.

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As we read a piece of internal evidence in the Rig-veda itself, these sages, placed themselves under the discipline of *Satya* (Truth) and *Rita* (Eternal Order) and *Tapas* (Spiritual austerity) and their word (*vak*) was a revelation of the innermost reality. The Rig-veda (*X, 71, 1-2*) holds, "Whatever was noblest and stainless and secretly treasured" in, "The first and foremost speech," sent by Brihaspati was "revealed by Him with love" to "the Sages" who have created the word, straining it through their spirit. It is the word that binds men in friendship.

बृहस्पते प्रथमं वाचो अग्रं यत्प्रैरत नामधेयं दधानाः ।
यदेषां श्रेष्ठं यदरिप्रमासीत् प्रेणा तदेषां निहितं गुहाविः ॥
(Rig-veda X, 71, 1)

सक्तुमिव तितउना पुनन्तो यत्र धीरा मनसा वाचमक्रत ।
अत्रा सखायः सख्यानि जानते भद्रैषां लक्ष्मीर्निहिताधि वाचि ॥
(Rig. X, 71, 2)

The number of the Vedas is four; The Rig-veda; Sama-veda; Yajur-veda, Atharva-veda. The Rig-veda, according to the only extant Sakalya recension consists of 1017 hymns and if the eleven supplementary hymns called the Valkhilya, which were inserted in the middle of the eighth Book are added, the total comes to 1028. The Rigveda, "the oldest book in the library of mankind", as Max Muller affirms it, consists of 10552 mantras and the hymns are grouped in 10 mandalas (cycles).

According to Shatapatha Brahmana, the total number of words in the Rig-veda is 432000 (=12000×36) as under.

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द्वादश बृहतीसहस्राणि एतावत्यो ह ऽ र्चो प्रजापतिसृष्टाः ॥

(*Shat. Brah. X, 4, 2, 23*)

The Sama-veda, a collection of melodies (Saman-melody) consists of 1875 mantras and is divided into two parts—the Purvarchika, consisting of single melodies, and the Uttararchika, consisting of complex melodies recording mostly *trika* (त्रिक) or *pragatha* (प्रगाथा).

The Yajur-veda (Vajasaneya samhita) consists of 1976 mantras. It is known as the ritual Veda and serves as a guide to the priest (*adhvaryu*) who is incharge of practically everything in the sacrifice except recitation of the mantras. The Yajur-veda is divided into forty chapters.

The Atharva-veda is divided into twenty books (Kandas) and consists of 5987 mantras. It has come down to us in two recensions–the Saunakiya and the Paippalada.

The Recensions :

The Vedic samhitas have come down to us in 1131 recensions:

Rig-veda has	21
Sama-veda has	1000
Atharva-veda has	9
Yajur-veda has	101

These recensions facilitate interpretation of the Vedic texts; for example, in a text of the Yajur-veda (Chapter I, verse 18) we have two different renderings in two recensions; viz, भ्रातृव्यस्य वधाय and द्विषतो वधाय

Now भ्रातृव्य means 'enemy' and 'uncle' both, and the Kanva Shakha has clarified, the meaning of the text, as killing the enemy by rendering द्विषतो in place of भ्रातृव्यस्य, rather than

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accept the popular meaning as 'killing the uncle' which is inappropriate. A Vedic commentator must have a thorough grasp of these different renderings, otherwise, relying only on the popular meaning he is likely to create confusion in interpreting the Vedic texts.

Literature Based on the Vedas

Apart from the four samhitas, with their several renderings, we have other literature based on the Vedas viz. the Brahmanas, Aranyakas, Upanishads etc. While these compositions provide facility in the exposition and interpretation of the Vedic texts, they cannot be taken as part and parcel of the Samhitas, as is erroneously believed in certain quarters. For example, speaking briefly, there are several Vedic mantras in the Shatapatha Brahmana (the Brahmana of the Hundred Paths) which are translated and explained in detail, as,

(अग्ने व्रतपते व्रतं चरिष्यामि तच्छकेयं तन्मे राध्ययताम् (*Yaj. 1,5*)
The Brahmanas are distinct theological treatises and in support of their explanation of the ceremonials they "interview exegetical, linguistic, and etymological observations and introduce philosophical speculations in confirmation of their cosmogonic and theosophic theories."

But a variety of interpretation is available in these treatises, historical, mythological, philosophical etc. and it is a great help in the exposition of the Vedic mantra in its various aspects, for example, Vishnu with His three feet may be the mythological god out of which we have the story of the Dwarf incarnation, begging 3 feet of space from Bali. But Vishnu is *Time* (कालो वै विष्णुः) and His 3

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feet are Past, Present and Future. Vishnu is *Sacrifice* (*Yajna*) यज्ञो वै विष्णुः and His three feet are the 3 priests. The देवाः may be taken as many gods in the mythological sense but (विद्वांसो हि देवाः —शत. ब्रा.) "the learned are the Devas." As we shall see later, Trita, in a mythological aspect, may be the name of a sage, but speaking mathematically it also means "one third" and so on so forth.

The Aranyakas are the forest books meant for the pious few, who no longer have to perform sacrifices and which, according to Prof. Oldenberg "owing to the superior mystic sanctity of their contents were communicated to the pupil in the solitude of the forest."

The Upanishads are purely philosophical treatises and belong to the latest stage of Brahmana literature.

Keys to Vedic Interpretation

In the interpretation of a Vedic text, it is essential to have complete knowledge of the six limbs of the Vedas, called the Vedangas. They are:

(a) Shiksha ... The Science of Phonetics
(b) Vyakarana ... Grammar
(c) Nighantu ... Exegesy
(d) Chhandas ... Prosody
(e) Jyotish ... Astronomy
(f) Kalpa ... including the Dharma-sutras giving the principles of Law, the Srauta sutras—giving the rules of Vedic rituals, the Grihya-sutras—Giving the rules of domestic ceremonies.

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A knowledge of these is imperative to arrive at the correct interpretation both of the derivative significances (*Yaugik*) and the arbitrary connotations (*Rurhi*).

Apishali, a predecessor of Panini in his Shiksha (phonetical treatise) has rightly administered a warning to the half-baked scholar attempting to mis-handle a Vedic text, in these words:—

दुष्टः शब्दः स्वरतो वर्णतो वा मिथ्या प्रयुक्तो न तमर्थमाह।
स वाग्वज्रो यजमानं हिनस्ति यथेन्द्र शत्रुः स्वरतोऽपराधात्॥

A Vedic word distorted by faulty pronunciation or mis application of alphabets, does not convey the true meaning, but destroys the applier, like a thunderbolt in speech, as it were, just as, on account of wrong emphasis and pronunciation of इन्द्र शत्रुः the man was himself destroyed. Or as a nursery rhyme goes :—

Once there was a Wily
And that Wily is now no more
For what he thought was H_2O
Was H_2SO_4.

Both water (H_2O) and Sulphuric acid (H_2SO_4) are colourless liquids but Wily mistook the outer colour and lost his life. In a Vedic hymn we have गौः to mean sun's rays and also cow, in the total list of 47 different meanings ascribed to this word, but interpreting the text viz:

अघासु हन्यन्ते गावः अर्जुन्योः पर्युह्यते

(*Rig. X, 85, 13*)

One interpretor has sanctioned the 'killing of cows' in Vedic marriage ceremonies-absolutely ignoring all other texts and references in which she has been called अघन्या, (not

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worthy of being killed). The other has simply and correctly taken it to mean the 'cooling down of the Suns' rays in winter, the season of marriages.'

It need not be stressed, in fine, that the diversity and complexity of Vedic interpretation arise only on account of the lack of knowledge of these six limbs.

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CHAPTER II

Purpose and Character of Mathematics in the Vedas

"In Mathematics, more than elsewhere, the love of truth may find encouragement for waning faith". (Bertrand Russell-*Mysticism and Logic*, p. 73)

Spiritual value of Mathematics

"God is a Geometrician," says Plato truly. Who has, in fact, not stood, in awe and reverence, under the canopy of Heaven as the stars have paraded their glories overhead, pointing to the "Something, doing something, we do not know what" in the words of Eddington. ?

The Indian seers, with all the resources of a subtle and powerful metaphysical mind, visualised the introduction of Mathematics in the eternal wisdom of the Vedas, to know that "Something." The Vedic hymn enjoins upon Man a sublime aim of his life in these words.

देवस्य पश्य काव्यम् न ममार न जीर्यति ॥

(*Atharva. X, 8, 32)*

"Gaze at His manifestation, which does not die nor grow old."

Plato, the mighty philosopher is said to have inscribed this warning at his door, "Nobody untrained in Mathematics may cross this my threshold."

As Russell testifies, "Plato regarded the contemplation of mathematical truths as worthy of the Deity" *(Mysticism and Logic, p. 59)*. Citing a passage from Plato's *Laws* Russell continues that "according to Plato, there in mathematics, something, which is necess-

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ary and cannot be set aside, and if I mistake not, of divine necessity,..... those things without some use or knowledge of which a man cannot become a God to the world, nor a spirit nor yet a hero, nor able, earnestly, to think and care for man." (*Ibid.* p. 60)

Mathematics opens out a way to the discovery of the right values of life and is a pre-requisite for all higher philosophy and metaphysics.

2. Apara Vidya

Mathematics is classified as *Apara Vidya* (अपराविद्या) and is introduced in the scriptures as an aid and adjunct to *paravidya*, the spiritual knowledge of Brahman.

In the Chhandogya Upanishad, Chapter VII, section I, we have a dialogue between Narada and Sanat Kumar, when the former approached the sage for supreme knowledge. Sanat Kumar asks him as to what sciences and arts, Narada had already learnt. Thereupon, Narada tells him that he had learnt, *inter alia*,, astronomy and arithmetic. (राशिविद्या)

अधीहि भगव इति होपससाद सनत्कुमारं नारदः ।
तं होवाच यद्वेत्थ तेन मोपसीद ततस्त ऊर्ध्वं वक्ष्यामीति ॥१॥
स होवाचर्वेदं भगवो ऽध्येमि यजुर्वेदं ।
सामवेदमाथर्वणं चतुर्थमितिहास—
पुराणं पञ्चमं वेदानां वेदं पित्र्यं राशिं
दैवं निधिं देवविद्यां ब्रह्मविद्यां
भूतविद्यां क्षत्रविद्यां नक्षत्रविद्यां
सर्पदेवजनविद्यामेतद्भगवोऽध्येमि ॥

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Of a truth Narada repaired to Sanat Kumara. He said, "Deign to give me instruction, O Lord." Unto him, said the other, "Relate unto me what you know. I shall than teach you, what is beyond." He replied, "O Lord, I have read the Rig-veda, the Yajur-veda, the Sama-veda, the Atharva-veda, the Itihasa and Purana, Grammar, Rituals, *the Science of Numbers (Arithmetic and Algebra)*[1], Physics, Chronology, Logic, Polity, Technology, the Sciences cognate to the Vedas, the Science of Spirits, Archery, Astronomy, the Science of Antidotes, and the Fine Arts." "All these have I read, O Lord." (*The Twelve Principal Upanishads*, Vol. III, by Mitra and Cowell, published by the Theosophical Publishing House, Adyar)

Commenting on that enumeration of arts and sciences included in the list of Apará Vidyá (Secular knowledge), B.B. Dutt remarks that "the culture of the Science of Mathematics or of any other branch of secular knowledge was not considered to be a hinderance to spiritual knowledge. In fact, Apará Vidyá was, then, considered to be a helpful adjunct to Pará Vidyá (Spiritual knowledge)." (*History of Hindu Mathematics*, Part, I)

3. An Essential Science

Mathematics is considered to be the most pre-eminent and essential science. As we read in Vedánga-Jyotish :

यथा शिखा मयूराणां नागानां मणयो यथा ।
तद्वद्वेदाङ्ग शास्त्राणां गणितं मूर्धनिस्थितम् ॥

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[1] **B.B. Dutt also takes Rasi Vidya to connote Arithmetic. The view of certain scholars who connect this राशिविद्या with the science of Astrology and take Rasi as the sign of the zodiac, has not much support.**

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"As the crests on the heads of peacocks, as the gems on the hoods of serpents, so is Mathematics (to be reckoned) at the top of the sciences known as Vedánga."

4. Requires Rigid Training

Mathematics is a hard task master and in a world busy with the *sugary namby-pambyism of* material sensations and theoretical speculations, it is difficult to excite interest in this subject. All knowledge is acquired through labour and austerity, as the Vedic saying goes :—श्रमेण तपसा सृष्टा । But its practical utility as an instrument of guidance to the distant shores of transcendental bliss cannot be over-emphasized. To achieve this end, the student of Mathematics requires a rigid training, which is sadly lacking now-a days. Rightly observes H. Zimmer, "in modern times a high school education and four years of college are supposed to open an access to the *sanctum sanctorum* of ultimate truth." (*Philosophies of India*, p 47)

Once when lecturing to a class, Lord Kelvin is said to have used the word "Mathematician" and then interrupting himself asked the class, "Do you know what a Mathematician is?" Then on the black-board he wrote :

$$\int_{-\infty}^{+\infty} e^{-x^2} dx = \sqrt{\pi}$$

Pointing with his finger to what he had written in terms of Integral Calculus, he said : "A Mathematician is one to whom THAT is as obvious as that twice two make four to you."

But the modern inflated egotist with his purely intellectual and superficial approach to all matters, wants

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to understand the nature of THAT immediately without requisite training or Tapas.

5. No Commercial Bargaining

The world of to-day wants exciting experiments and tangible results. Tyndall, rejoicing over his theory, said, "Thank God, it will not produce any practical results, no one will ever be able to take out a patent and make money by it."

Leibnitz never had a commercial outlook on his Differential Calculus nor did Newton earn a patent for his Theory of Gravitation nor did any scientist or mathematician sell the ineffable joy of his discovery in the market.

An incident is related in the life of Euclid, when someone who had read the first proposition of Geometry with Euclid himself, questioned the Master, "But what shall I get by learning these things?"

Euclid, at once, called his slave and said, "Give this man a couple of coins, since he must make gain out of what he learns."

As in morals, so in Mathematics, "Life of the Spirit is not a commercial transaction in which the profit has to be anticipated, it is a kind of experience which is inherently profitable." *(A Preface to Morals,* Walter Lippman)

It was Pythagoras who held that "the disinterested study of Mathematics and Music was cleansing to the passions and also that, in order to be disinterested, it was necessary to have purity of mind."

6. Inspires Reason and Faith

According to Bertrand Russell, the study of Mathematics inspires reason, the mathematician's "Confidence in

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the truth of what has been demonstrated and in the value of demonstration." *(Mysticism and Logic. p. 62)*

Study of Geometry inspires faith. "You have to assume the truth of everything obvious and the theorems are at once startling and easily verifiable by actual drawing, such as those in which it is shown that three or more lines meet in a point." (Ibid.)

In Algebra, the use of letters and unknown quantities is a mystery. It awakens *mystification* and reasoning in the student, in the words of Russell.

After we have studied all the above three branches, we come to the study of Infinitesimal Calculus and the whole range of higher Mathematics leading to the conception of Infinity.

Zeno is the founder of the Philosophy of Infinity.

As Russell observes, "The solution of the difficulties which formerly surrounded the mathematical infinite is probably the greatest achievement of which our own age has to boast." *(Ibid., p. 64)*

7. Contribution to Technology

Looking over the kaleidoscope of the world events, we find that man's efforts and achievements, emerging from the darkness of pre-historic times, have been climaxed by the great scientific achievements of the New Age, a Sputnik age, ushering in an era of changes, so rapid, so powerful and cataclysmic !

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What is the contribution of Mathematics to these scientific discoveries, to this age of machines, sweeping before them the foundations of a long hoary past and placing an entirely new set of values on Man and Matter. In the words of Russell, "To those who inquire as to the purpose of Mathamatics, the usual answer will be that it facilitates the making of machines, the travelling from place to place, and the victory over foreign nations, whether in war or commerce." *(Ibid., p. 59)* How is this brought about ?—through the reasoning faculties which are trained by Mathematics, through rules and axioms of mathematics, which help the technician to avoid pitfalls. The practical utility of mathematics as technical training for engineers cannot be over emphasized, and Russell holds, without exaggeration, that "The use of steam and electricity has been rendered possible only by mathematics," and that is its triumph in the practical mechanics of science.

The Nebular Hypotheses of Kant and Laplace, and Einstein's Theory of Relativity verified from the observations of the displacement of the Light of Stars at the Solar Eclipses of 1919 and 1922; and the dynamics of the spiral nebulae of Jeans and Eddington, whereby "the Earth has been dethroned from the centre of the Universe, the Sun has been dethroned from the centre of the Galaxy and Man has been dethroned from the summit of Creation." have been made possible only by the hypotheses of Mathematics.

As we shall see in a later series viz. '*Science and Technology in the Vedas*," all technological knowledge,

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which appears in a nucleus form in the Samhita text and is developed immensely in the *Brahmanas* and allied *literature* given by sages. (e.g. Bharadvaja's *Vimana Shastra*, the Science of the Aeroplanes) would be impossible without the aid of Mathematics.

The purpose of introducing Mathematics in the Vedas is, therefore, both spiritual and secular.

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CHAPTER III

Vedic References to and Development of Arithmetic, Geometry and Algebra

There are several references to Arithmetic in the Vedic hymns which are classified as under :—

1.	Numbers from 1 to 10	Atharv. XIII, 4.
2.	Additions of numbers with multiple of 10	Atharv. V, 15.
3.	Additions of 2	Yaj. XVIII, 24.
4.	Additions of 4	Yaj. XVIII, 25.
5.	Mention of the digit 99	Rig. I, 84, 13.
6.	Multiplication by 11	Atharv. XIX, 47.
7.	Vedic numeral system	Yaj. XVII, 2.
8.	Reference to fractions	Rig. X, 90.

We now quote each *mantra* with relevant translations.

(1) Numbers from 1 to 10

य एतं देवमेकवृतं वेद
न द्वितीयो न तृतीयश्चतुर्थो नाप्युच्यते ।
न पञ्चमो न षष्टः सप्तमो नाप्युच्यते
नाष्टमो न नवमो दशमो नाप्युच्यते ॥

(Atharv. XIII, 4, 16–18)

"To him who knoweth this God as simple and ONE, neither second nor third nor yet fourth is He called, He is

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called neither fifth nor sixth nor yet seventh, He is called neither eighth nor ninth, nor yet tenth." (Griffith).

2. Addition of Numbers with Multiples of Ten.

एका च मे दश च मे	1+10=11
द्वे च मे विंशतिश्च मे	2+20=22
तिस्रश्च मे त्रिंशच्च मे	3+30=33
चतस्रश्च मे चत्वारिंशच्च मे	4+40=44
पञ्च च मे पञ्चाशच्च मे	5+50=55
षट् च मे षष्टिश्च मे	6+60=66
सप्त च मे सप्ततिश्च मे	7+70=77
अष्ट च मे ऽशीतिश्च मे	8+80=88
नव च मे नवतिश्च मे	9+90=99
दश च मे शतं च मे	10+100=110
शतं च मे सहस्रं च मे	100+1000=1100

(*Atharva. V, 15, 1–11*)

One and ten, Two and Twenty etc., etc.

The meaning is simple and explicit. On this, Griffith writes, "Eleven of the hymns, which are a charm for general prosperity, are exactly the same with the exception of the numbers which increase by eleven in each stanza (thirty and three, forty and four, and so on) upto one hundred and ten in stanza 10, stanza 11, concluding with one thousand and one hundred."

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3. Additions of 2.

एका च मे तिस्रश्च मे	1+2=3
तिस्रश्च मे पञ्च च मे	3+2=5
पञ्च च मे सप्त च मे	5+2=7
सप्त च मे नव च मे	7+2=9
नव च मे एकादश च मे	9+2=11
एकादश च मे त्रयोदश च मे	11+2=13
त्रयोदश च मे पञ्चदश च मे	13+2=15
पञ्चदश च मे सप्तदश च मे	15+2=17
सप्तदश च मे नवदश च मे	17+2=19
नवदश च मे एकविंशतिश्च मे	19+2=21
एकविंशतिश्च मे त्रयोविंशतिश्च मे	21+2=23
त्रयोविंशतिश्च मे पञ्चविंशतिश्च मे	23+2=25
पञ्चविंशतिश्च मे सप्तविंशतिश्च मे	25+2=27
सप्तविंशतिश्च मे नवविंशतिश्च मे	27+2=29
नवविंशतिश्च मे एकत्रिंशच्च मे	29+2=31
एकत्रिंशच्च मे त्रयस्त्रिंशच्च मे	31+2=33

यज्ञेन कल्पन्ताम् ॥ [*Yajurveda XVIII, 24*]

Translation : 'May my one and my three, and my three and my five, and my five and my seven (and similarly upto thirty three) prosper by sacrifice.' (Griffith)

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4. Additions of Four.

चतस्रश्च मे ऽष्टौ च मे	4+4=8
अष्टौ च मे द्वादश च मे	8+4=12
द्वादश च मे षोडश च मे	12+4=16
षोडश च मे विंशतिश्च मे	16+4=20
विंशतिश्च मे चतुर्विंशतिश्च मे	20+4=24
चतुर्विंशतिश्च मे ऽष्टाविंशतिश्च मे	24+4=28
अष्टाविंशतिश्च मे द्वात्रिंशच्च मे	28+4=32
द्वात्रिंशच्च मे षट्त्रिंशच्च मे	32+4=36
षट्त्रिंशच्च मे चत्वारिंशच्च मे	36+4=40
चत्वारिंशच्च मे चतुश्चत्वारिंशच्च मे	40+4=44
चतुश्चत्वारिंशच्च मे ऽष्टाचत्वारिंशच्च मे	44+4=48

यज्ञेन कल्पन्ताम् ॥ (*Yajurveda XVIII, 25*)

"May my Four and my Eight and my Twelve (and similarly upto forty eight) prosper by sacrifice" (Griffith).

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5. Mention of the Digit 99.

इन्द्रो दधीचो अस्थभिर्वृत्राण्यप्रतिष्कृतः
जघान नवतीर्नव ॥

(Rig. I, 84, 13)

"With bones of Dadyach for his arms Indra resistless in attack struck *nine-and-ninety* Vritras dead." (Griffith).

According to the well known tradition, "Dadhichi was a sage, son of Atharva, he and his father being regarded as the first founders of sacrifice. He is described as having the head of a horse given to him by the Asvins, which was afterwards cut off by Indra with his bones, or as the legend says, with the bones of this horse's head, converted into a thunderbolt, Indra slew the Vritras or demons who withheld the rain." (Griffith, *Translation of the Hymns of the Rigveda*, Vol. I, p. 108)

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6. Multiplication by 11

ये ते रात्रि नृचक्षसो द्रष्टारो नवतिर्नव ।
अशीतिः सन्त्यष्टा उतो ते सप्त सप्ततिः ॥
षष्टिश्च षट् च रेवति पञ्चाशत् पञ्च सुम्नयि ।
चत्वारश्चत्वारिंशच्च त्रयस्त्रिंशच्च वाजिनि
द्वौ च ते विंशतिश्च ते रात्र्येकादशावमाः ॥

(Atharva, XIX, 47)

"This is a hymn to Night for protection from fiends, robbers, snakes, and wolves.

Thy Ninety-nine examiners (Sentinel Stars), O Night, who look upon mankind, eightyeight in number or seven and seventy are they, sixty and six, O Opulent, fifty and five, O happy one, Forty and four and thirty-three are they, O thou enriched with spoil, Twenty-and-two hast thou, O Night, eleven, yes and fewer still." (Griffith)

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7. Vedic Numeral System

इमा मे अग्न इष्टका धेनवः
1 10 100
सन्त्वेका च दश च, दश च शतं च
1000
शतं च सहस्रं च, सहस्रं चायुतं च
आयुतं च नियुतं च
नियुतं च प्रयुतं च
अर्बुदं च न्यर्बुदं च
समुद्रश्च मध्यं चान्तश्च परार्धश्चैता मे
अग्न इष्टका धेनवः सन्त्वमुत्रामुष्मिँल्लोके ॥

(*Yajur. XVII, 2*)

"O Agni, may these bricks be mine own milch kine; one and ten, and ten tens, a hundred and ten hundreds, a thousand, and ten thousands, a myriad, and a hundred thousand and a million; and a hundred millions, and an ocean, middle and end, and a hundred thousand millions, and a billion.

May these bricks be mine own milch-kine in yonder world and in this world" (Griffith). We may compare, also, the reference to this numeral system in *Atharvaveda* VIII, 8. 7,

बृहत् ते जालं बृहत् इन्द्र शूर
सहस्रार्घस्य शतवीर्यस्य
तेन शतं सहस्रमयुतं न्यर्बुदं
जघान शक्रो दस्यूनामभिधाय सेनया ॥

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"Great is thy net, brave Indra, thine the mighty match for a thousand, Lord of Hundred Powers ! Holding them with his host, therewith hath Indra slaughtered Dasyus, a *hundred, thousand, myriad, hundred millions*" (Griffith).

A Unique System

This numeral system going upto such high order, is unique in the world.

Alluding to this order, Alberuni writes, "I have studied the names of the orders of the numbers in various languages with all kinds of people with whom I have been in contact and have found that no nation goes beyond the thousand. The Arabs, too, stop with the thousand..... Those, however, who go beyond the thousand in their numeral system, are the Hindus.....They extend the names of the *orders* of numbers until the 18th order..... ..... . The 18th order is called *Parardha* i.e. the half of heaven, or more accurately, the half of that which is above." (Alberuni, *India*, Vol. I, p. 174).

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8. Vedic Reference to Fractions

As Prof. Kapadia, rightly, observes in his *Introduction to Ganitatilaka* published by the Baroda Oriental Institute in 1937, at p. Lvi—

"We can trace the knowledge of fractions as far back as the Vaidika period. For in the Rig-Veda (X, 90, 4) we have the term tri-pada and in the Maitrayani Samhita (III, 7, 7) the terms Kala ($\frac{1}{16}$), Kustha ($\frac{1}{12}$), Pada ($\frac{1}{4}$), and Sapha ($\frac{1}{8}$)". The word Kala has been frequently used in the Sulba Sutras to denote fraction.

We now give below the relevant Samhita texts indicating knowledge of fractions in the Vedic period.

सहस्रशीर्षा पुरुषः सहस्राक्षः सहस्रपात् ।
स भूमिं विश्वतो वृत्वात्यतिष्ठद्दशाङ्गुलम् ॥
पुरुष एवेदं सर्वं यद्भूतं यच्च भाव्यम् ।
उतामृतत्वस्येशानो यदन्नेनातिरोहति ॥
एतावानस्य महिमातो ज्यायांश्च पूरुषः ।
पादोऽस्य विश्वा भूतानि त्रिपादस्यामृतं दिवि ॥

[Rig. X, 90]

वसो ३ह्येष विन्दते यः सोमं क्रीणाति
सोमविक्रयित्सोमं ते क्रीणानि
महान्तं वह्वर्हं बहु शोभमानं
कलया ते क्रीणानि, कुष्ट्या ते क्रीणानि
शफेन ते क्रीणानि । पदा ते क्रीणानि । इति०

[मैत्रायणी संहिता 3/7/7]

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Arithmetical Mode of Expression in the Vedas.

For the sake of metrical facility, the numbers which are large, are expressed in additive method: For instance, we have an expression for 3339 in the Rig Veda X, 52, 6 as

त्रीणि शता त्रीसहस्राणि त्रिंशच्च नव च

three hundreds and three thousands and thirty and nine.

The mantra runs thus :

त्रीणि शतात्री सहस्राण्यग्निं
त्रिंशच्च देवा नव चासपर्यन् ।
औक्षन् घृतैरस्तृणन् बर्हिरस्मा
आदिद्धोतारं न्यसादयन्त ॥ *(Rigveda X, 52, 6)*

Herein we have a reference to 3339 gods, "a solitary passage," according to Wilson, "and one of which the commentator has given no satisfactory explanation, raises the number of deities, which is wholly incompatible with the ordinary enumeration."

The Decimal System

It is admitted by scholars, that the modern decimal-place value notation was known in India in the 4th century before the Christian era.

Paying a tribute to Indian genius, Laplace, the great scientist, says :

"How grateful we should be to the Hindus who discovered this great decimal system that did not occur to the minds of such mighty mathematicians as Archimedes and Appollonius."

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(A) THE ORIGIN AND DEVELOPMENT OF HINDU GEOMETRY

Science of Geometry was first invented in India by the Hindus from the Vedic rules for the construction of sacrificial altars. The world owes its first lesson in this science, not to Greece but to India, and it is admitted by scholars that the Pythagorean theorem was known in India at least two centuries before Pythagoras was born and it is found in the Sulba Sutras dating from 8th Century B.C.

The Sulba Sutras are treatises dealing with the construction of altars. The greatest care was taken to construct the altars of a particular size and shape in the performance of sacrifices. Any lack of precaution or inaccuracy in this regard was likely to vitiate the very purpose of sacrifice and could lead to adverse effects.

For instance, the altars of गार्हपत्य must be of the form of a square according to one school and of a circle according to the other while the आहवनीय altars must be constructed in the form of a square and the दक्षिण altars must be semi-circular.

The area of each must be the same. This is with reference to the three obligatory sacrifices.

Similar restrictions apply to other sacrifices known as the Kamya (काम्य-optional sacrifices) which are performed with the sole motive of achieving a special object. In the construction of these altars, so many Geometrical constructions are involved e.g. construction of a square on a given straight line, circling a square, doubling a circle,

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Construction of an isoceless trapezium with face, base and altitude being given, etc. etc.

According to B. K. Sarkar : "The earliest geometry of the Hindus is to be found in the 'Sulba-Sutras' of Baudhayana and Apastamba. In these treatises which form parts of the vedic literature, we get the application of mathematical knowledge to the exigencies of religious life, sacrifices, rituals, construction of altars etc. At this stage Hindu geometry was quite independent of Greek influence".

(Hindu Achievements in Exact Sciences, p. 16).

Mitra boldly affirms, "The fact that the Indians took the chord of a smaller circular arc as equivalent in length to the arc - a step which no sane Greek mathematician with a free conscience would have even dreamt of taking - ought to settle once for all the question of the dependence of Indian Geometry on Greek Geometry."

In the Rig Veda I, 15, 12, there is a specific mention of the गार्हपत्य fire by name.

गार्हपत्येन सन्त्य ऋतुना यज्ञनीरसि ।
देवान्देवयते यज ।

(Rig. I, 15, 12)

"with Ritu, through the house-fire, thou kind giver, guidest sacrifice. Worship the gods for the pious man." (Griffith). So in Rig. X, 85, 27.

इह प्रियं प्रजया ते समृध्यताम्
अस्मिन्गृहे गार्हपत्याय जागृहि ।
एना पत्या तन्वं सं सृजस्व
आधा जित्री विदथमा वदाथः ॥

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"In this thy (husband's family) may affection increase with offspring, be watchful over the *domestic fire*, in this house-unite thy person with this thy husband, and both growing old together govern your household."

(Griffith)

(B) VEDIC REFERENCES TO HINDU GEOMETRY

I Conception of the Circumference of a Circle (परिधिः)

कासीत्प्रमा प्रतिमा किं निदानम्
आज्यं किमासीत् परिधिः क आसीत् ।
छन्दः किमासीत् प्रउगं किमुक्थं
यद्देवा देवमयजन्त विश्वे ॥

(Rig. X, 130, 3)

What is the measurer ? Who measures and counts all ? What is the cause and what the essence, like ghee, in this world ? What is the *Circumference* ? What is the independent and what the praiseworthy object ? (the answer is) —the Supreme Lord whom the learned have worshipped.

II. Area of a Triangle (त्रिभुज)

यो अक्रन्दयत् सलिलं महित्वा
योनिं कृत्वा त्रिभुजं शयानः ।
वत्सः कामदुघो विराजः
स गुहा चक्रे तन्वः पराचैः ॥

(Atharv. VIII, 9, 2)

"He who prepared a *threefold* home and lying there made the water bellow through his greatness—calf of

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Viraja giving each wish, fulfilment, made bodies for himself far off, in secret." (Griffith).

'Threefold home' refers to the triangle (त्रिभुज) of heaven, firmament and earth, wherein Agni dwells as sun, lightening and fire.

III. Principle of Trita. (त्रित)

अभि स्ववृष्टिं मदे अस्य युध्यतो
रथ्वीरिव प्रवणे सस्रुरूतयः ।
इन्द्रो यद्वज्री धृषमाणो अन्धसा
भिनद्वलस्य परिधीँरिव त्रितः ॥

(Rig. I, 52, 5)

"To him as in wild joy he fought with him who stayed the rain, his helpers sped like swift streams down a slope.

When Indra, thunder—armed, made bold by some draughts, as Trita cleaveth Vala's fences, cleft him through." (Griffith).

As Pandit Raghu Nandan observes in *Vaidic Sampatti*, this reference to Trita is the Geometrical conception of a ratio of circumference (परिधिः) to diameter (व्यास) of a circle. As we know in Geometry, this ratio must be more than 3 $\because \frac{\text{Circumference}}{\text{Diameter}} = \frac{22}{7} = 3\frac{1}{7}$

Diameter is almost one third of the circumference, hence the ratio is called Trita. If the circumference is 22, the diameter must be 7. In this mantra, a conception has been drawn in which, the ratio is exactly $\frac{1}{3}$.

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∴ the diameter will cross the circumference and will not actually fit in.

In its mythological aspect, Sayana refers to a legend which says that Trita fell into a well and the Asuras heaped coverings over its mouth but he broke through them with ease. So Indra broke down the defence of the demon Vala.

IV. Surface of a Cylinder

त्रितः कूपे ऽवहितो देवान्हवत ऊतये
तच्छुश्राव बृहस्पतिः कृण्वन्नंहूरणादुरु०

(*Rig. I, 105, 17*)

Trita, when burried in the *well*, calls on the gods to succour him. That call of his, Brihaspati heard and released him from distress—Mark this my woe, ye Earth and Heaven." (Griffith).

In this Mantra, too, the well, which is cylindrical has been sunk defectively, for if the ratio is only $\frac{1}{3}$ then any one will be squeezed in that. Trita was obviously caught in such a cylindrical diagram and called for the mathematician who detected the irregularity. He was Brihaspati, the man of knowledge, who saved Trita. The implication is clear, that, if the ratio is more or less than $\frac{22}{7}$ then the diameter will not be correctly set but will cross through like a chord.

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III. HINDU ALGEBRA

Origin and Development of Hindu Algebra

The Hindus gave Algebra, *Bija-ganita*, in contrast to Arithmetic, called the *pati-ganita*, to the western world through the Arabs who translated it in the 8th Century A.D. and Leonardo De Pisa first introduced it in Europe in the 13th Century A.D.

The great Indian Mathematician Bhaskaracharya (1150 A. D.) wrote exhaustive treatises on Plane and Spherical Trigonometry and Algebra and his works contain solutions of remarkable problems which were not achieved in Europe until the 17th and 18th Centuries.

As B.B. Dutta states : 'The use of symbols—letters of the alphabet to denote unknowns, and equations are the foundations of the science of Algebra. The Hindus were the first to make systematic use of the letters of the alphabet to denote unknowns. They were also the first to classify and make a detailed study of equations. Thus they may be said to have given birth to the modern science of algebra."

(History of Hindu Mathematics, Preface)

The opinion of Sir Monier Williams on this is significant: "The name Algebra (from the Arabic, *Al Jabr*) 'the reduction of parts to a whole or of fractions to integers' shows that Europe received algebra like the ten numerical symbols from the Hindus through the Arabs. The Sanskrit word for algebra, Bija-Ganita means 'calculation of seeds, calculation of original or primary elements' i. e. analysis.

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If the Greeks did not receive their first ideas of algebra from the Hindus, it may, at least, be taken as proved (from all that Colebrooke has so ably written on the subject) that the Hindus were certainly not indebted to the Greeks, but invented their system independently." (*Indian Wisdom* P. 174).

The development of the Hindu Algebra can be traced to the Brahman a period but it was evolved out of Geometrical calculations relating to the fixing of altars.

We have the following passage in the Shatapatha Brahmana in which the Mahavedi (the Great altar) is described to be of the form of an isoceless trapezium, in which the unit of measure is $14\frac{3}{7}$. The text is as under :

ते ये ह तथा कुर्वन्ति । एतं हे त
पितरं प्रजापतिं सम्पदश्च्यावयन्ति ॥
त ऽइष्ट्वा पापीयां सो भवन्ति ।
सा यावत्येषा सप्तविधस्य वेदिः
तावतीं चतुर्दश कृत्वा एकशतविधस्य
वेदिं विमिमीते । अथ षट् त्रिंशत्
प्रक्रमां रज्जुं मिमीते । तां सप्तधा समस्यति
तस्यै त्रीन् भागान् प्राच उपदधाति
निःसृजति चतुरः ॥

(*Shatapatha, X, 3—7&8*)

"Indeed, those who do it in that way, deprive their Father Prajapati of his due proportions, and they will

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become the worse for sacrificing, for they deprive Father Prajapati of his due proportions. As large as this Vedi (Mahavedi) of the seven fold (fire altar) is fourteen times as large as he measures out the Vedi of the One hundred and one-fold (altar).

He now measures off a cord, thirty six steps (yards) long, and folds it up into seven (equal) parts; of this he covers (the space of) the three front (eastern) parts with bricks, and leaves four parts free."

(*Sacred Books of the East Series Vol. XLIII P-310*)

How algebra is derived from the Geometrical calculations can be easily understood from the equation $ax=b^2$ which is nothing but a geometrical expression, transforming a square into a rectangle having a given side.

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CHAPTER IV

Mathematical Reflections on Human Life

"Snakes in Iceland? There are no snakes in Iceland!" So can it be said about the philosophy of Mathematics with its vast conceptions ranging from zero to infinity. The Vedic approach to life and its philosophy is the man's endeavour to proceed from mortality to immortality. So goes the Vedic Prayer :

तमसो मा ज्योतिर्गमय
मृत्योर्मा अमृतं गमय ॥

"From darkness lead me unto light, from mortality lead me unto immortality". And so the student of Mathematics passes from the zero of egolessness to the infinity of supreme intelligence and fulfils his aim of life in this vast "Golgotha of the Universe," as Carlyle conceived it.

Talking of this philosophy in terms of a fraction, Carlyle says, "The fraction of life can be increased in value not so much by increasing your numerator as by lessening your denominator. Unity divided by zero will give infinity. Make thy claim of wages a zero, then thou hast the world under thy feet". As a formula goes :

$$\text{Happiness} = \frac{\text{Possession}}{\text{Want}}$$

If we decrease the 'want'—denominator, we, increase our happiness, till when want approaches zero, happiness approaches infinity. The Western way is to increase the numerator, while the Eastern mode is to look to the denominator and reduce the wants by renunciation.

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It does not matter whether a person is rich or poor, has a possession of 5 or 500; if he can just have a control over the denominator, squeezing himself as much as he can, he will be able to have an increased quantum of happiness. On the other hand, if possession is 1 lakh, and 'wants' are double, the happiness will be one half.

In a simple and sublime exposition of this formula, we read in the Katha Upanishad, that the summum bonum of human life can be achieved in the simplest way i.e. by reducing wants.

यदा सर्वे प्रमुच्यन्ते कामा ये ऽस्य हृदि स्थिताः
अथ मर्त्योऽमृतो भवत्यत्र ब्रह्म समश्नुते ॥

(*Kathopanishad II, 6, 14*)

"When *all the desires cease* which were cherished in his heart, then the mortal becomes immortal, then he obtains, here Brahm n."

In a small treatise of this type, it is not our purpose to take flights into the metaphysics of Vedanta, but to evolve a practical outlook given by Mathematics, by confining ourselves to the two numbers, zero and infinity–representing the alpha and omega of all human existence.

Logical Implication of Infinity

In dealing with the Logic of the Infinite, Ouspensky observes in his *Tertium Organum*, "The mathematics of the trans-infinite numbers may serve as an example of real mathematics violating the fundamental axioms of our mathematics and logic."

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we know that $5-5=0$

and $100-100=0$

and so one finite quantity subtracted from the same finite quantity gives the result as zero, but in case of infinity, this ordinary logic will not apply, for $\infty-\infty=\infty$. And we read the source of this mathematical equation in a Vedic prayer

पूर्णस्य पूर्णमादाय
पूर्णमेवावशिष्यते

"Taking the whole (infinite Brahman) from the whole, the whole remains." To a realized soul, therefore, with all his vision and breadth of his views–all–encompassing and all-embracing-the ordinary laws of human life, with all their clashing implications and insiduous machinations, do not apply. Though bound by apparent limitations, yet conscious of the Infinite within him, he is able to overcome the limitations of worldly perceptions. Thus unfolding the highest discernment, he maintains the Infinite reservoir of power within.

So in case of Powers in Mathematical operation

$$5^5 = 5 \times 5 \times 5 \times 5 \times 5$$

but $\infty^{\infty} = \infty$

$$\frac{5}{5} = 1$$

but $\frac{\infty}{\infty}$ = Indeterminate.

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Thus we find that there is a clear departure from the law of finite numbers when we switch over to conception of infinity.

Such as one achieves the highest bliss and is one with God, who as Empedocles wrote in a Geometrical symbolism "is a circle whose centre is everywhere and circumference nowhere."

Logical Implication of Zero.

As in the case of infinity, a vision full of all-embracing sublimity, so in the case of zero, a self denial and renunciation of the highest order, the laws of ordinary mathematics, applied to finite numbers, do not operate.

A zero-man is different from the finite-mortal clinging to the transitory glitter of materialism which obscures the vision to higher reality. But renunciation must be complete like the Karma yoga of the Bhagavad-Gita and should not be a spiritual indigestion—a feeble and fleeting escape from a temporary surfeit of unpleasantness of life. Zeroes will only *then* become Heroes, in complete self-abnegation.

We have, in *Yajurveda*, chapter 40, verse 1, the highest code of morality, enjoining a self-detached enjoyment of worldly possessions.

The verse goes thus:

'ईशा वास्यमिदं सर्वं यत्किं च जगत्याम् जगत्
तेन त्यक्तेन भुञ्जीथा, मा गृधः कस्यस्विद्धनम् ॥

(*Yajurveda, XL, 1,*)

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"Enveloped by the Lord must be this all—each thing that moves on earth.

With that renounced, enjoy thyself, covet no wealth of any man." (Griffith).

Did not Jesus Christ show the same path ? "If any man will come after me, let him deny himself and follow ME." (*Matthew* XVI, 24)

In fact, in its historical perspective, the discovery of Zero by the Indian seers is the greatest triumph in the history of Mathematics. Number ten is the basis of the universally recognized system of numerology, in which the nine figures derive their value from their positions.

As G. H. Lewis writes, "The Infinity is no more a quantity than Zero is a quantity. If Zero is a sign of vanished quantity, the infinite is a sign of that continuity of existence which has been ideally divided into discrete parts in the affixing of Limits."

In the words of Paul Carus, "Infinity is the Land of mathematical hocus-pocus. There Zero, the magician is the King. When Zero divides any quantity he changes it without regard to its magnitude into the Infinitely great and inversely when divided by any number he begets the infinitely small.

In this domain, the circumference of the circle becomes a straight line and then the circle can be squared.

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Here all ranks are abolished, for Zero reduces everything to the same level one way or the other. Happy is the kingdom where Zero rules." (Cited from *Where Science and Theosophy Meet*, Vol. I, by Prof. Kanga)

Let us take a simple example and observe what this magician does when entering a mathematical operation. We take the equation

$$a^2 - a^2 = a^2 - a^2$$

then $a(a-a)=(a+a)(a-a)$

taking out $(a-a)$ common, $a=a+a$

$\therefore a=2a$

$\therefore 1=2$

This absurdity appears, because we have divided both sides by Zero

$\because \frac{\text{Zero}}{\text{Zero}}$ is not equal to 1 but is indeterminate.

So when a Zero-man enters a society, he performs such miracles and gets into pre-eminence by shaking all limitations, which bind the average finite individual.

A writer has aptly said : "A prudent man believes in the figure 1 (One) which according to him, endows the Zero with value, while the man of faith, believes that it is Zero which endows One with value ! Prudence is the arithmetic of fools."

The entire universe is a symbol of Pure Mathematics in which, God, the Pure Mathematician geometrises in all shapes provided by nature—straightline, circle, cone, cylinder etc.

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Bernard Shaw says in his book *'The Adventures of a Black Girl in Her Search for God,'* "You cannot teach these people the truth about the universe. Ask that girl to divide a quantity by the square root of minus X and she will not have the faintest notion of what you mean.

Yet the division by the Square Root of Minus X is the key to the Universe."

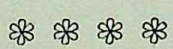
In a simple but suggestive and inspiring formula, Einstein has given his equation of life. The great Scientist and founder of New Physics was once approached for his rule of life and he said: "My rule of life or formula of achievement, is an equation and it is this :

$A = f(x, y, z)$

where A = Achievement
X = Work
Y = Play
Z = Keeping the mouth shut.

Do not be talkative. If you would achieve, then work and play and go from time to time into silence."

This is called Einstein's Equation in the context of Mathematical Philosophy.



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Appendix A

Chronology (as agreed upon by Western scholars) of earliest Indian and Greek mathematicians.

(1)	बौधायन	wrote	शुल्वसूत्र	800 B.C.
(2)	आपस्तम्ब	,,	,,	400 B.C.
(3)	आर्यभट्ट	,,	आर्यभट्टीय	499 A.D.
(4)	वराहमिहिर	,,	पञ्चसिद्धान्तिका	505 A.D.
(5)	भास्कर I	,,	लघुभास्करीय	522 A.D.
(6)	लल्ल	,,	शिष्य-धि-वृद्धि	598 A.D.
(7)	ब्रह्मगुप्त	,,	खण्डखाद्यक	628 A.D.
(8)	श्रीधर	,,	त्रिशतक	750 A.D.
(9)	महावीर	,,	गणितसारसंग्रहः	850 A.D.
(10)	आर्यभट्ट	,,	महासिद्धान्त	950 A.D.
(11)	श्रीपति	,,	गणिततिलक	1039 A.D.
(12)	भास्कर	,,	बीजगणित	1150 A.D.
(13)	नारायण	,,	,,	1350 A.D.
(14)	नारायण	,,	गणितकौमुदी	1356 A.D.
(15)	नीलकण्ठ	,,	तन्त्रसंग्रहः	1500 A.D.

Greek Mathematicians

(1)	Pythagoras	580 B.C.
(2)	Horaclides	388 B.C.
(3)	Aristotle	384 B.C.
(4)	Aristorchus	310 B.C.
(5)	Appollonius	230 B.C.

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(6) Hipparchus 126 B.C.

(7) Ptolemy 2nd century A.D.

(Wrote *Mathematical Syntaxis*)

Note :—The Arabians came into the field in the 8th century A.D.

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Appendix B

Word numerals used in the Vedic Period

0 = शून्य, ख, गगन, अम्बर, आकाश
1 = आदि, शशि, इन्दु, चन्द्र, मृगाङ्क
2 = यम, अश्विन् , कर, युगल
3 = राम, गुण, त्रिगुण, लोक
4 = वेद, श्रुति, समुद्र, सागर, अवधि
5 = बाण, शर, सायक
6 = रस, अङ्ग, कायः, ऋतु ·
7 = नग, भूभृत्, पर्वत
8 = वसु, नाग, भूति,
9 = अङ्क, निधि
10 = दिश् , दिक् , आशा, अङ्ग लिः
11 = रुद्र
12 = आदित्य
13 = भागवत
14 = मनु
15 = तिथि
16 = संस्कार
17 = महासंस्कार
18 = पुराण
19 = महापुराण
20 = महादिशा
21 = त्रिलोक
24 = गायत्री

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27 = नक्षत्र
28 = योग
48 = जगति

In the vedas, we find examples where the numbers denote the things and not that the name of the thing denotes numbers, for example, in *Rigveda* VII, 103, 9, we find the number 12 used to denote a year (= 12 months)

देवहितिं जुगुपुर्द्वादशस्य ऋतं नरो न.....

❀ ❀ ❀

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Book III
The Science of Medicine

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The Blessed Doctor

How blessed is the profession of a physician! Charles Dickens has one of the characters, the wife of a medical man, say, "I never walk with my husband, but I hear the people bless him. I never go into a house of any degree but I hear his praises. I never lie down at night but I know that in the course of that day, he has alleviated pain, and soothed some fellow creature in the time of need".

(*Bleak House*)

———

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INTRODUCTION

Aim and Purpose of the Treatise

The purpose of presenting this treatise on *Medicine in the Vedas*, is to stimulate and enlarge the interest of the modern physician, who in the course of his practical experience has to confront the same problems of Health and Longevity, as the sages of yore had to face. Making himself familiar with the earliest traditions and the most advanced documents of Indian medicine, available in the metrical parts of the vedas, particularly the *Atharvaveda*, he is likely to gain a fresh impulse and insight not only about the cultural heritage of India but also about the nature of Hindu medical technique and discipline.

With the enrichment of knowledge provided by the Ayurvedic system of medicine, the allopathic practitioner can make effective improvements upon his own system. There is yet much to be desired in modern medicine inspite of its laudable contributions in the form of new drugs and equipments. Dr. Carrel, the great Nobel-prize winner, who was on the staff of the *Rockfeller Institute of Medical Research* in New York for over thirty years, holds the view that, "Modern medicine is far from having decreased human suffering as much as it endeavours to make us believe. We die in much larger proportion from degenerating diseases and lingering deaths caused by chronic affections."

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2. Researches on Hindu Medicine.

So far as Hindu medicine is concerned, it has an old history, but it received recognition in the world very steadily. In Alexander's times, the Greeks had already known its excellence and when the Muslims first came into contact with India, its knowledge spread into Arabia.

The Portuguese Garcia-da-orta studied it in the 16th century, while in the 17th century, the Dutch BONTIUS took it to Java and then to Europe. In the nineteenth century, an impetus was given by the western scholars and numerous articles appeared in French papers and a space was given to Hindu Medicine in the Encyclopaedic Dictionary of Medical Sciences, numbering a hundred volumes in the period ranging from 1864 to 1889.

In Germany, Dr. J. Jolly made important contribution to the spread of knowledge on Indian medicine. His *Medizin* forms part of the series of the Encyclopaedia of Indo-Aryan Research (Vol. 3, part 10) founded by Dr. Buhler.

The collection made by the French physician Dr. P. Cordier, and his annotations of the medical passages in the *Rigveda* and *Atharvaveda*, and also the Upanishads, epics and law books is commendable.

Hindu medicine was also introduced to the West through the monumental work of the great philologist and indologist, Prof. H.H. Wilson. He wrote his

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essay on the *Medical and Surgical Sciences of the Hindus* as far back as 1823. Later appeared Prof. Royle's *Essay on the Antiquity of Hindu Medicine* in London in 1837.

There were intensive efforts at editions and translations of works on Hindu Medicine. Whitney's translation of the hymns of the *Atharvaveda*, showed the way and then appeared the translation of Charaka, Sushruta and Vagbhatta. The monograph of Julius Jolly is an excellent work. Jolly made a comprehensive survey of the available materials, in his work *Indische Medizin*.

During the 7th century A. D., under the patronage of Khalif Almansur, the two *samhitas* of Charaka and Sushruta were translated into Arabic. Charaka is mentioned in the Latin translations and as Farishta, the Muslim historian attests, *some sixteen other works on Hindu medicine were known to the Arabs in the 8th century A.D.* From Sushruta to Vagbhatta of the 8th century A. D. there is a remarkable advancement in Hindu medicine and as Zimmer rightly points out, 'Caraka, Susruta and Vagbhatta form the famous triad *of the Ancients*' and are considered the three great medical authorities of the subsequent ages (yuga of the present cycle of the universe"). (*Hindu Medicine*, p. 60).

3. The Earliest Indian Traditions of Medicine

Medicine is at once a science and a "wisdom of long life". (*Caraka* 1, 1):

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3. The Earliest Indian Traditions of Medicine

Medicine is at once a science and a "wisdom of long life". (*Caraka* 1 1):

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The Hindu medical lore, with all its encyclopaedic character, is a revelation of divine wisdom and came from Brahma, who revealed it to Prajapati, whence it went on to Asvini twins, the physicians of the gods. They passed it on to Indra.

It is stated that when the span of life became short on account of non-observance of the prescribed religious rites and discipline, the sages gathered together to approach Indra. History records the first international medical conference that was held in Ceylon. This was attended by Pulastya, the grandfather of Ravana, and sage Agastya. A resolution to send the great Bhardvaja to the kingdom of Indra was unanimously adopted in this conference, with a view to obtaining the "boundless, and shoreless, eternal and auspicious science" in the form of three pithy and axiomatic truths about causes (हेतु:) and the symptoms (लिङ्ग) and the remedies (औषध) which was known only to Brahma.

त्रिसूत्रं शाश्वतं पुण्यं बुबुधे यं पितामह:

These three *sutras* are हेतुसूत्र, व्याधिसूत्र and औषधसूत्र

(i) Knowledge of the causes of diseases;

(ii) Knowledge of different diseases affecting human flesh;

(iii) Knowledge of the medicines for treatment of these diseases.

This *Trisutra* contains the comprehensive know-

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ledge of the cardinal doctrine of the *Tridosha* regulating the entire science of ancient Hindu medicine.

Gradually, the expansion of knowledge took place and with an intuitional insight, the sages, discovered individual substances and herbs; noticed similarities and dissimilarities and various properties therein, and with the applications of laws of *inherence, signature* and other principles, made the unfoldment available to the saint Punarvasu Atreya who taught this science to six of his disciples, Agnivesa, Bhela, Jatukarna, Parasara, Harita and Ksharpani. Agnivesa's encyclopedic work has come to us in the redacted form of Caraka Samhita.

(अग्निवेशकृते तन्त्रे चरकप्रतिसंस्कृते)

There is a diversity of views as to the period, when Caraka flourished. Some take him to belong to the first century A D., when he was the court-physician of king Kanishka, others take him to a period far earlier than this, on the basis of commentaries on this text which pertain to very ancient dates.

Charaka's is a rich harvest of medical knowledge paving a way to Sushruta, who incorporated *surgery* in his Samhita and introduced a broader base of learning instead of adhering to a single method and enjoined upon the physician to master other branches of knowledge also, known as the *ashtangas*, otherwise one fails to get a thorough command over the medical lore.

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Cf. एकं शास्त्रमधीयाननो न याति शास्त्रनिर्णयम् ।

4. The Eight Branches of Hindu Medicine.

The eight branches of medicine which the medical practitioner was expected to master are enumerated as under,

(1) *Surgery*, (*Salya*-literally arrow)-methods of removing foreign bodies, obstetrics, treatment of injuries etc.

(2) *Salakya*, the treatment of ailment of the parts above the clavicles, affecting the eyes, ears, nose and throat etc, in which thin instruments like Salakya (needles) are used.

(3) *Kaya-chikitsa*, (therapy of the organism) treatment of diseases affecting the whole body originating from the disturbance of the three humours.

(4) *Bhuta-vidya*, (Demoniacal diseases) dealing with mental derangements and psychic ailments supposed to have been caused by the demons, or the Mahabhutas. The remedies here are mainly prayers, oblations, exorcism etc,

(5) *Kumara-bhrtya* - Treatment of children's diseases.

(6) *Agada* - Medicinal drugs, used as antidotes for poisons.

(7) *Rasayana* - elixirs of life.

(8) *Vajikarna* - turning into a stallion-dealing with the means of increasing virility and strength.

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(5) The Basic Theory of Hindu Medicine.

The basic theory of the Hindu medicinal system is the theory of the three *doshas* which in the words of Dr. Jolly, "goes like a red thread through the whole of medicine." (*Indian Medicine*-p. 59)

Modern medical science has come to appreciate these dynamic and vital potentials of Ayurveda in Vata, Pitta and Kapha.

In an illuminating article viz. *Clinical Evaluations of Ayurvedic Principles and Treatment*, Dr. P.M. Mehta, M.D. M S., F.C.P.S., F.I.C., writes. "The entire series of diseases evolved and existing in the universe cannot dissociate from the elemental organizations of life viz., *Vata, Pitta* and *Kapha*.

Dr. Hans Selye also pronounces that some manifestations of the general adaptive syndrome (*dosha* symptoms) will avoidably be superimposed upon the specific symptoms caused by the specific causative agent of the disease.

Here lies the grandeur of the clinical science and fundamentals of *Ayurveda*. The concepts visualised in the pre-microscopic age continue to be eternal truths, even in the present electron-microscopic and atomic age." (*Nagarjuna*, Vol. II. p. 982)

Both in prophylactic and curative therapy in *Ayurveda*, these three universal concepts viz.

(1) Bio-material organisation (कफ)

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(2) Bio-thermal or metabolic organisation (पित्त)

(3) Bio-motor or motivational organisation (वात)

are analysed and applied.

(*b*) *A word about the Greek Origin of the Tridosha theory* will not be out of place here. I have made a mention of it in the following pages in chapter III of this treatise. Suffice it to say here, that the European scholars who are ignorant of the trends of science laid down in the Vedic *Samhitas* with expositions in the *Brahmanas* look in vain for inspiration to the Greeks and Arabians. In fact whether the attempt is conscious or unconscious, there is such a twisting of facts by the oriental scholars leaning to the so-called Greek origin of art, science and culture that conclusions are drawn in a way in which they can fit in with this theory, reserving all benefits of doubt as regards date and chronology.

Max Muller also refers to this customary trend when he says, while maintaining a state of equilibrium between the cultural contribution both of India and Greece, "In some respects, and particularly in respect to the greatest things.....India has much to teach us as Greece and Rome, nay, I should say more. We must not forget, of course, that we are the direct intellectual heirs of the Greeks and that our philosohpical currency is taken from the capital left to us by them. Our palates are accustomed to the food which they have supplied to us from our very child-

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hood, and hence whatever comes to us now from the thought mines of India is generally put aside as merely curious or strange, whether in language, mythology, religion or philosophy."

(*Annals Land Syne* p. 161)

(6) **Plan of the Treatise.**

This treatise is divided into four chapters and contains two appendices, Chapters I and II are mainly devoted to the *Atharvaveda* and its place in the Vedic literature. According to one set of scholars, the vedas are four in number, the other set takes them as three and there is still another school which takes them as one. This chapter is mainly devoted to a discussion of these views so as to remove the discrepancy between three and four. The view that there was only one veda, the *Rigveda* in the beginning and the other vedas are mainly repetitions of mantras out of that veda, is untenable and has no support of scholars.

Chapter III dispels the gravest doubts of the scholars who treat the *Atharvaveda* as a veda of charms and spells. The various terms like *Rakshasa, Kimidin, Yatudhana* etc. etc. occuring in the *Atharvaveda* refer to various types of germs that cause diseases but have been mistaken for demons and sorcerers.

The *Atharvaveda* is essentially a veda of medicine, prescribing remedies for killing of germs which cause diseases.

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The metrical parts of the vedas contain the earliest documents of Indian materia medica-*Atharvaveda* VIII, 7, consisting of 28 stanzas and *Rigveda* X, 97, are addressed to healing herbs in a remedial rite against consumption (*Yaksma*).

Commenting upon these hymns, Zimmer elaborately writes, "The gathering together of all plants and herbs existing on earth by the enumeration and description af their characteristics and forms, is one of the *lei motifs* of the hymns, (1,4,8,13,27); the full treasury of healing forces in vegetation, called by "a thousand names."

Vast material of Hindu medicine and its subtle ramifications—in the broad and graphic descriptions-medical lore, Physiology-dietetics.....is to be brought to the aid of the patient. In so far as they form part of the physician's wisdom, they are all brought together and blended into an all-powerful arcanum, but there are many which are unknown to the doctor herbalist (13,18); nor are they listed by medical tradition, however, they are well-known to other beings, domestic animals and beasts of the wilderness birds and insects, and to genii presiding over the life-cycle in man and nature (23-25). These are conjured to enter the arcanum magically and present in virtue if not in substance to concur in the effect of healing." (19) (*Hindu Medicine*, p. 17)

Chapter V deals with the vast material of Hindu

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medicine which exists in a nucleus form in the graphic descriptions in the *Atharvaveda*. This Veda, apart from its being a *Brahmaveda*, dealing as it does with the Highest Reality, is the oldest literary document on Hindu Medicine.

There are two *Appendices* attached to this treatise. Particular attention of the readers is invited to *Appendix B* which is a masterly exposition of the contribution of India to Physiology and Medicine in the words of Dr. A. Basham, Reader in the History of India at the University of London. We need not agree with him on some of the observations, particularly when he holds that the ancient Indian doctors had no clear knowledge of the functions of the brain, yet in its broad and graphic outlines, the piece is informative and illuminating.

New Delhi,
May 18, 1959.

Dharma Deva Mehta

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CHAPTER I

An Introductory Approach to the Vedas

When Shri Aurobindo Ghosh, the great seer, mystic and philosopher, paid a tribute to the genius of Swami Dayananda Saraswati, the vedic scholar of unprecedented depth and vision, he uttered a profound truth. In the words of the mighty sage, "In the matter of vedic interpretation. I am convinced that whatever may be the final vedic interpretation, Dayananda will be honoured as the first discoverer of the right clues" (*Dayananda and the Vedas-p. 60*).

Leaving aside the technique of vedic interpretation in its historical, etymological or philosophical aspects, the profundity and vastness of Vedic Literature and the fact that the vedas are a repository of all knowledge of art, science and philosophy, cannot be disputed.

As is aptly said, they are "the institution of a timeless revelation and a divine truth given to humanity."

Derivation of the word *Veda*.

Veda primarily signifies "knowledge" from vid,-to know, and designates, sacred lore, revealed by God, to the consciousness of the sages, Agni, Vayu, Aditya and Angirasa.

As we read a piece of internal evidence in the Rigveda itself, sages placed themselves under the discipline of *Satya* (Truth) and *Rita* (Eternal order) and *Tapas* (spiritual austerity) and their word (vak) was a revelation of the innermost reality. The *Rigveda* X, 71, 1-2 holds, "Whatever was noblest and stainless and secretly treasured in, "The first and foremost speech", sent by Brihaspati was revealed by Him with love" to "the sages", who have created the word, straining

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it through their spirit. It is the word that binds men in friendship."

बृहस्पते प्रथमं वाचो अग्र यत्प्रैरत नामधेयं दधानाः
यदेषा श्रेष्टंयदरिप्रमासीत्, प्रेणा तदेषां निहितं गुहाविः
(*Rig*, X, 71,1)
सक्तुमिव तित-मवउना पुनन्तो यत्र धीरा मनसा वाचमक्रत ।
अत्रा सखायः सख्यानि जानते भद्रैषां लक्ष्मीर्निहिताधि वाचि॥

The number of the vedas is four; The Rigveda; Simaveda, Yajurveda; Atharvaveda. The Rigveda, according to the only extant Sakalya recension consists of 1017 hymns and if the eleven supplementary hymns called the *Valkhilya* which were inserted in the middle of the eighth Book are added, the total comes to 1028. The Rigveda, the oldest book in the library of mankind," as Max Muller affirms it. consists of 10552 mantras and the hymns are grouped in 10 mandalas (cycles).

According to Shatapatha Brahmana, the total number of words in the Rigveda is 432000 (12000x36) as under,

द्वादश बृहतीसहस्राणि एतावत्योह ऽर्चो प्रजापतिसृष्टा :
(Shat. Brah. X,4,2, 23)

The Samaveda, a collection of melodies (कौथुमशाखा) consists of 1875 mantras and is divided into two parts-the Purvarchika, consisting of single melodies, and the Uttararchika, consisting of complex melodies recording mostly trika त्रिक or pragatha प्रगाथा.

The Yajur-veda (Vajasaneya samhita) consists of 1976 mantras. It is known as the ritual veda and serves as a guide to the priest (*adhvaryu*) who is incharge of practically everything in the sacrifice except recitation of the mantras. The Yajur-veda is divided into forty chapters.

The Atharvaveda is divided into twenty books (Kandas) and consists of 5987 mantras. It has come down to us in two popular recensions-the Saunakiya- and the Paippalada, out of the total of nine enumerated *infra*.

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The Recensions :

The vedic samhitas existed in 1131 recensions :

Rigveda	21
Samaveda	1000
Atharvaveda	9
Yajurveda	101

These recensions facilitate interpretation of the vedic texts; for example, in a text of the Yajurveda Chapter I, verse 18) we have two different renderings in two recensions; viz. भ्रातृव्यस्य वधाय and द्विषतो वधाय.

Now भ्रातृव्य means enemy' and 'uncle' both, and the Kanva *Shakha* has clarified, the meaning of the text, as killing the enemy by rendering द्विषतो in place of भ्रातृव्यस्य rather accept the popular meaning as ,'killing the uncle" which is inappropriate. A vedic commentator must have a thorough grasp of these different renderings, otherwise, relying only on the popular meaning, he is likely to create confusion in interpreting the Vedic texts. The Atharvaveda which we are studying now in the context of Medicine has a total of nine recensions:-

Paippalada	पैप्लादः
Taudah	तौदा :
Maudah	मौदा :
Shaunakiya	शौनकीया :
Jajalah	जाजलाः
Brahmvadah	ब्रह्मवदा :
Devdarshah	देवदर्शा :
Charanvaidya	चारणवैद्या :
Jaldah	जलदाः

Literature Based on the Vedas

Apart from the four samhitas, with their several renderings, we have other literature based on the Vedas viz. the *Brahmanas, Aranyakas, Upanishads*

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etc, While these compositions provide facility in the exposition and interpretation of the Vedic texts, they cannot be taken as part and parcel of the Samhitas, as is erroneously believed in certain quarters. For example, speaking briefly, there are several Yaju mantras in the Shatapatha Brahmana (the Brahmana of the Hundred Paths) which are translated and explained there in detail, as,

अग्ने व्रतपते व्रतं चरिष्यामि तच्छकेयं तन्मे राध्यताम् (Yaj. I. 5)

The Brahmanas are distinct theological treatises and in support of their explanation of the ceremonials, they "interview exegetical, linguistic, and-etymological observations and introduce philosophical observations in confirmation of their cosmogonic and theosophic theories".

There are citations of the vedic mantras which are commented upon by Brahmanas and commentaries or expositions cannot be held to be the part of the texts which they interpret and clarify, much less Gervinus' commentaries on Shakespeare's plays can be taken to be the part of Shakespeare's monumental works,

It is truly held by Bhatta Bhaskara, a commentator of the vedas, ब्राह्मणं नाम कर्मणस्तन्मन्त्राणां चव्याख्यानग्रन्थ : "the *Brahmanas* are expositions of the Karma (Yajna) and their mantras."

But a variety of interpretation is available in these treatises, historical, cosmic, philosophical etc., and it is a great help in the exposition of the vedic mantra in its various aspects, for example, Vishnu with His three feet may be the mythological god, out of which we have the story of the Dwarf incarnation, begging 3 feet of space from Bali. But Vishnu is Time कालो वै विष्णु: and His 3 feet are Past, Present and Future. Vishnu is Sacrifice (Yajna) यज्ञो वै विष्णु: and His three feet are the 3 priests. The देवा: may be taken as many gods in the popular sense but विद्वांसो हि देवा: the learned

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are the Devas." Similarly, Trita, in a historical aspect, may be the name of a sage, but speaking mathematically, it also means "one third" and so on, so forth.

The Aranyakas are the forest books meant for the pious few, who no longer have to perform sacrifices and which, according to Prof. Oldenberg "owing to the superior mystic sanctity of their contents were communicated to the pupil in the solitude of the forest."

The Upanishads are purely philosophical treatises and belong to the concluding part of Brahmana literature.

Keys to Vedic Interpretation

The popular study of Nirukta, (philology etc.), a work by Yaskacharya, a vedic commentator of the 5th century before Christ ? cannot be overemphasised. The Nirukta is a glossary of nearly 2000 difficult and important key-words collected from the Samhitas by Yaska and arranged in a list which is known as Nighantu-a vedic lexicon.

In a popular context of the *Atharvaveda* which we propose to study in the next pages, we find that the words *Kimidins*, *Yatudhanas* are misinterpreted as malignant spirits while a close student of Nirukta VI, 11 will readily understand that these are two kinds of worms. The किमिदी किमिदानीमिति चरते is thus derived,

These are kinds of worms which move about with a will to sting, humming किमिदाम्, किमिदानीम् what is this ? what now ? And यातुधान are those kinds of worms which inflict pain. The word is thus derrived यातना दुखं तं दधति ते यातुधाना:

The whole structure of the *Atharvaveda* changes, when we go deep into these connotations and instead of treating the vedic texts as referring to ghosts and demons and sorcerers, take them as meaning different kinds of germs that infest the atmosphere and for killing of which the *Atharvaveda* provides various remedies.

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We shall discuss in this respect, interesting details and misconstructions placed by some of the western indologists, in the chapters following,

The Six Limbs of the Vedas

In the interpretation of a vedic text, it is essential to have complete knowledge of the six limbs of the vedas, called the Vedangas. They are :

(a)	Shiksha	.....The Science of Phonetics
(b)	Vyakarana	.....Grammar
(c)	Nighantu	.....Exegesy
(d)	Chandas	.....Prosody
(e)	Jyotisha	.....Astronomy
(f)	Kalpa	..... including the Dharma-sutras giving the principles of Law, the Srauta sutras-giving the rules of vedic rituals, the Grihya-sutras-giving the rules of domestic ceremonies.

A knowledge of these is imperative to arrive at the correct interpretation both of the derivative significances (Yaugika) and the arbitrary connotations (Rurhi).

Apishali, a predecessor of Panini in his *Shiksha* (phonetical treatise) has rightly administered a warning to the half-baked scholar attempting to mis-handle a Vedic text, in these words:-

दुष्टः शब्दः स्वरतो वर्णतो वा मिथ्या प्रयुक्तो न तमर्थमाह

स वाग्वज्रो यजमानं हिनस्ति यथेन्द्रशत्रुः स्वरतोऽपराधात् ॥

A Vedic word distorted by faulty pronunciation or misapplication of alphabets, does not convey the true meaning but destroys the applier like a thunderbolt in speech, as it were. just as, on account of wrong emphasis and pronunciation, of इन्द्र शत्रुः वर्धस्व the man was himself destroyed.

Or as a nursery rhyme goes:-

Once there was a Willy

And that Willy is now no more,

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For what he thought was H_2O
Was $H_2 SO_4$.

Both water H O and Sulphuric acid $H_2 SO_4$ are colourless liquids but Willy mistook the outer colour and lost his life. In a vedic hymn we have गौः to mean, sun's rays and also cow, in a total list of 47 different meanings ascribed to this word, but interpreting the text viz.

अधासु हन्यन्ते गावः अर्जुन्योः पर्युह्यते (*Rigveda* X, 85, 13)

one interpreter has sanctioned the 'killing of cows' in Vedic marriage ceremonies-absolutely ignoring all other texts and references in which she has been called अघन्या (not worthy of being killed). The other has simply and correctly taken it to mean the 'cooling down of the suns' rays in winter, the season of marriages',

It need not be stressed, in fine, that the diversity and complexity of Vedic interpretation arise only on account of the lack of knowledge of these six limbs.

* * *

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CHAPTER II

The Place of Atharvaveda in the Vedic Literature

The entire literature on medical science is available in a nucleus form in the *Atharvaveda*. However, there are a few references to chemistry and chemical composition of gold etc. in the *Rigveda* and *Yajurveda* (chapters 34, 41 and 42) also. As we shall see later, we have references to Ayurveda and Allopathy, which has in its Pharmacopia, the basic herbal medicines of the Ayruveda, Homeopathy, Hydropathy, Chromopathy and Psychotherapy etc., etc. in the *Atharvaveda*.

But there is some criticism which is levelled against this particular samhita, and there are two main aspects of this criticism-viz.

1. The vedas are only three in number and the *Atharvaveda* has no place in the canonical collections.

2. The *Atharvaveda* does not belong to the same age in which the *Rigveda* was revealed, but is much posterior to that. Linked with this, is rhe view that the *Atharvaveda* cannot be accepted as a book of knowledge. It can at best be taken as a book of sorcery, full of anxious dread of the evil spirits and demons to be exorcised or invoked.
Let us discuss these aspects one by one.

The First Aspect :-

The Number of the Vedas—Four, Three or one

According to one school of thought, there are four vedas, the Rik, Yajus, Sama and Atharva. According to the other school, the vedas are only three-the Rik, Yajus and Sama, comprising the 'त्रयीविद्या' 'the threefold knowledge'. There is the third school, according to which there is only one samhita-the Rik, and all other vedas are derived from

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thata-a majority of their mantras being mere repetitions of the Rik mantras.

(a) The First School-The Four Vedas

The following references show that the vedas are four in number. The Purusha Sukta of the *Rigveda* X. 90,9 clearly shows that there were four vedas in the beginning and they were revealed together out of the Cosmic Sacrifice.

तस्माद्यज्ञात् सर्वहुत ऋचः सामानि जज्ञिरे

छन्दांसि जज्ञिरे तस्मात् यजुः तस्मादजायत

From that sacrifice in whom the universal oblation was offered, the Richas and Samas were produced, from Him the Chhandas (the Atharvaveda) was born, from Him the Yaju was born. Atharvaveda is called Chandas and is so styled in Rig, IX, 113,6.

यत्र ब्रह्मा पवमानः छन्दस्यां वाचं वदन् ।

The Brihadaranyaka Upanishad confirms this in I, 2.5.

ऋचो, यजूंषि, सामानि छन्दांसि

The *atharvaveda* itself enumerates the four vedas in X, 7,20

यस्माद् ऋचो अपातक्षन् यजुर्यस्माद् अपाकषन्

सामानि यस्य लोमानि अथर्वाङ्गिरसो मुखम् ॥

Herein the *Atharvaveda* is called अथर्वाङ्गिरस

The Rigveda IV, 58,3, refers to चत्वारि शृङ्गा

चत्वारि शृङ्गा त्रयो अस्य पादा

द्वे शीर्षे सप्त हस्तासो अस्य

Commenting on this, Yaskacharya writes

चत्वारि शृङ्गेति वेदा वा एत उक्ताः (*Nirukta* XIII,7)

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Also in *Rigveda* I, 164,45,

चत्वारि वाक् परिमितां पदानि we have a reference to the speech in the context of the four vedas.

The *Gopatha Brahmana* holds the number four

चत्वारो वा इमे वेदा ऋग्वेदो यजुर्वेदो सामवेदो ब्रह्मवेद :

(II 16)

i e. The vedas are four, Rik.. Yaju.. Sama and Brahmaveda. This Brahmaveda, as we shall see later, is called Atharvaveda,

In Chandogya Upanishad chapter VII section I, we have a dialogue between Narada and Sanat Kumara when the former approached the sage for Brahmavidya. Sanat Kumara asks him as to what sciences and arts Narada had already learnt. There upon Narada tells him that he had learnt *inter alia* the four vedas.

स हो वाचर्ग्वेदं भगवोऽध्येमि

यजुर्वेदं सामवेदमाथर्वणं चतुर्थम् ।

Panini also refers to the four vedas making a specific mention of the *atharvaveda* in IV,3,133.

अथर्वाणिकस्यैकलापश्च

In the Brihadaranyaka Upanishad we have all the four vedas mentioned in

एंव वा अरे अस्य महतो भूतस्य निष्वसितमेतद्

ऋग्वेदो यजुर्वेद: सामवेदोऽथर्वांगिरस:

In *Atharvaveda* IX, 9.12, we have ब्रह्मा प्रजापतिर्धाता लोका वेदा: सप्तऋषय: Commenting on the plural number वेदा: Sayana writes

वेदा: साङ्गश्चत्वार:

The vedas are four, with four classifications of knowledge, viz Gyana, Karma, Upasana, Vignana.

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ऋचन्ति स्तुवन्ति पदार्थानां गुणकर्मस्वभावाननया सा ऋक्

the attribute, action and behaviour of the entities are explained by Rik.

यजन्ति येन मनुष्या ईश्वरम् तद् यजुः

By which the people perform sacrifices to God is called Yajus.

स्यति कर्माणीति सामवेदः

By which the actions are extinguished is called Samaveda.

संशयराहित्यं सम्पाद्यते येनेत्येर्थकथनम्

By which the doubts are removed is called the Atharvaveda,

and the doubts are removed by Knowledge or Vignana (science) which is the main approach of Atharvaveda.

According to Swami Dayananda Saraswati, the vedas are four. God revealed the four vedas, Rig, Yaju., Sama, and Atharvaveda to Agni, Vayu, Aditya and Angiras respectively (*Satyaratha Prakasha*, Chapter VII p. 220)
According to Pt. Satyavrata Samashrami a great vedic Scholar, the number of the vedas is four, though they relate to the three categories of composition.

सत्स्वपि चतुर्ष्वपि वेदेषु रचनात्रयभेदनिबन्धनं तेषु

त्रयित्वमव्याहृतमेव (निरुक्तालोचन पृ. १४८)

At the time of sacrifice, the *Rigveda* is represented by the Hota, the *Yajurveda* by the Adhvaryu, the *Samaveda* by the Udgata and the *Atharvaveda* by Brahma. i.e. the one that represents the Creator. It is apparent, therefore, that a place of honour and sanctity was accorded to this veda, which cannot be excluded from the Canonical collections.

The purpose of the mantras and their explanations are distinct in all the four vedas. As is aptly said :-

ऋग्भिः शंसन्ति, यजुर्भिर्यजन्ति
सामभिः स्तुवन्ति, अथर्वभिर्जपन्ति ॥

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The repetitions from Rigveda in the texts of the other vedas are merely an apparent illusion. In reality, all the four vedas, with their texts are entirely distinct in their connotation and application on the occasion of sacrifices,

(b) The Second School—the Three Vedas

There are several texts in which the three vedas are mentioned. This raises a doubt that the vedas were originally three in number and the *Atharvaveda* was added later. The *Yajurveda* XXXIV, 5, refers to the three vedas

यस्मिन्नृचः सामयजूंषि यस्मिन् प्रतिष्ठिता रथनाभाविवाराः ॥

'Where in the Mind are fixed, the Rik. Sama and Yajus-like spokes within a wheel.'

The Shatapatha Brahmana XI, 4,2,3, refers to the number three

त्रयो वेदा अजायन्त अग्नेर्ऋग्वेदो वायोर्यजुर्वेदः सूर्यात्सामवेदः ॥

Three vedas were revealed-from Agni, Rigveda. from Vayu-Yajurveda and from the Sun,-Samaveda. The *Aitareya Brahmana* confirms this in XXV.7. त्रयो वेदा अजायन्त the three vedas were revealed.

The text of the *Taittiriya Brahmana* 1,2,26 refers to the three vedas Rik., Yajus and Sama.

अहे बुध्नियमन्त्रं मे गोपाय यमृषयस्त्रैविदाः विदुः

ऋचः सामानि यजूंषि ॥

In *Gopatha Brahmana* 1,6, we read

तेभ्यः श्रान्तेभ्यस्तप्तेभ्य : सन्तप्तेभ्यस्त्रीन् वेदान् निरमिमत ॥

from the three austere deities, the three vedas were born. In the *Brihadaranyaka Upanishad* IV, 12. 2, there is a reference to the three vedas.

स यावतीयं त्रयी विद्या तावत् ह स जयति ॥

'He conquers all-whatever threefold knowledge is, viz, Rik. Yaju, Saman.'

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In the *Chandogya Upanishad* IV. 16,2 we have a reference to the three vedas only,

अग्नेर्ऋचो वायोर्यजूँषि सामान्यादित्यात् । स एतां त्रयीं विद्यामभ्यतपत् ॥

The three fold knowledge was revealed thus:- Rigveda from Agni, Saman from Aditya and Yajurveda from Vayu.
Manu smiriti 1,2,3 declares :

अग्नि वायुरविभ्यस्तु त्रयं ब्रह्म सनातनम्

दुदोह यज्ञसिद्ध्यर्थमृग्यजुः सामलक्षणम् ॥

'For the success of the Cosmic Sacrifice, He created the three eternal lores-Rik, from Vayu and Saman from Sun.
The *Mahabharata* I. 100,66 alsorefers to the three fold Khowledge अग्निहोत्रं त्रयी विद्यां and in III, 150,13 again

न सामर्ग्यजुर्वर्णा ॥

(C) The Third School—Only One Veda

According to this view, there was only the *Rigveda* and the other three vedas were composed later, with huge number of mantras repeated from the *Rigveda*.

The Rigveda has 10552 mantras. The Samaveda has a total of 1875 mantras, out of which 1783 mantras are already there in the Rigveda. Thus, the Samaveda has an original treasure of 92 mantras only. Similarly, in the *Yajurveda*, out of a total of 2086 mantras which the Kanva Samhita contains, there are about 2000 mantras which are repeated from the Rigveda and Samaveda. And in the *Atharvaveda* also, out of a total of 5977 mantras, there are numerous repetitions from the other vedas.

It could, therefore. be rightly inferred, that the original source of supply of the mantras was one-viz. the *Rigveda*.

In the *Mahabhärata* LXIV, 130 we read, that it was sage Veda Vyasa, who expanded the veda, so as to imply that there was only one veda and Krishna Dvaipayana expanded that and was thus known by the title "Vyasa" the creator, elucidator.

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विव्यासू वेदान् यस्मात् स तस्माद्व्यास इति स्मृत:

(*Mahabharata* LXIV, 130J

It is argued, that with the deterioration of man's intellect with the passage of time, Veda Vyasa divided the one veda into four, for facility of study. He segregated the mantras according to their utility and application in practical life, and thus gave them four distinctive characteristics.

The Samaveda has 92 mantras of its own, the rest are repetitions from the Rigveda. Yajurveda has borrowed 800 mantras from the Rigveda and in the *Atharvaveda*, we have 2000 mantras repeated from the Rigveda. If from the very beginning it is argued, the vedas had been four in distinct number, there had been no occasion for such a repetition.

The Shrimad Bhagavat Purana also affirms in IX, 15 that there was only one veda, only one God, only one Agni.

एक एव पुरा वेद: प्रणव: सर्ववाङ्मय:
देवो नारायणो नान्य: एकोऽग्निवर्ण एव च ॥

No Contradiction between Three and Four-Criticism Examined :

The unanimity of view of the vedic scholars is that the vedas are four in number, but they are taken as three in various texts of the Brahmanas or the Upanishads (although the same books at other places refer to the number four also), only to imply three fold knowledge which these four vedas embody. The three fold knowledge is Gnan, Karma and Upasana. The *Mahabharata* (*Shanti Parva* 135) elucidates it thus,

त्रयी विद्यामवेक्षेत वेदे सूक्तमथाङ्गत:
ऋक्सामवर्णाक्षरता यजु: सोऽथर्वणस्तथा ॥

That three fold knowledge is known as "त्रयीविद्या" which is the apparent cause of confusion between three and four. The threefold division is also in the Poetry, Prose and Mixed, which the composition of the four vedas reveals.

The view expressed by the third school of thought that the Samaveda has no independent existence and there

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was only one veda viz, the Rigveda, out of which all the other vedas are derived, does not hold ground in-as-much as there are several mantras in the *Rigveda* itself in which the independent entity of the Samaveda is recognised. For example.

तस्माद् यज्ञात्सर्वहुतः ऋचःसामानि जज्ञिरे (Rig. X, 90,6)

यो जागारः तमु सामानि यन्ति (Rig. V, 44, 14)

यज्ञन्मे सामगामुक्थशासम् (Rig. X, 10,7)

श्रवत्साम् गीयमानम् (Rig, VIII, 8, 1)

यूयं ऋषिमवथ सामविप्रम् (Rig. V, 54, 14)

अंगिरसां सामभिः स्तूयमानाः (Rig. I, 107,2)

बृहस्पतिः[2]सामभिर्ऋको अर्चतु (Rig. X, 36,5)

The *Atharvaveda* and the several Brahmana books recognize the Samaveda as independent of the other vedas. For example

सामानि यस्य लोमान्यथर्वाङ्गिरसो मुखम् (*Atharvaveda* X, 7 20)

यद् ऋग्वेदो यजुर्वेदः सामवेदोथर्वांगिरसः (*Shatapatha* XI, 5,4, 1)

सूर्यात् सामवेदः (*Shatapatha* XI, 5,8,3)

सामवेद आदित्यात् (*Aitareya Brahmana* XXV. 7)

According to Griffith, the text of the *Samaveda* is older than that of the *Rigveda*. Moreover in Rig. VIII, 87,1, we find the word स्तोम being used and stoma prayers are used only in the *Samaveda*. This clearly presupposes the existence of Samaveda of. द्युम्नी वां स्तोमो अश्विना।

Again in *Rigveda* VI, 36,3, समुद्रं न सिन्धव उक्थशुष्मा

and in *Rigveda* VIII, 6,35, इन्द्रमुक्थानि वावृधुः

and in *Rigveda* VIII, 16,2, यस्मिन्नुक्थानि रण्यन्ति

we have the word '*uktha*' being used. This word *uktha*, is the title of one category of Samaveda. If Samaveda had no independent existence, how could this word referring to

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Samaveda find a place in the *Rigveda*.

There is the word सामग used in the Rigveda X. 100,6

In *Aitareya Brahmana*, we are familiar with the account that Prajapati collected the materials and gave the title of *hota* होता to the knower of the Rigveda, and to the knower of the Yajurveda, the name of Adhvaryu, and the knower of the Samaveda was called Udgata. Brahma was he who knew all the four vedas.

All these four representatives must be there in each yajna. Brahma's job is to supervise and see that nothing goes wrong in the pronunciation of the mantras otherwise he will have to perform प्रायश्चित्त 'penance' by performing havans which are variously described in the *Brahmana*. The *Aitareya Brahmana* which is of the Rigveda clearly describes all these details and if there were only one veda-viz. Rigveda, there would be no yajans and no penance havanas and no representatives at the sacrifices.

It is, therefore, axiomatic that all the other vedas existed simultaneously with the Rig veda. One thing which is most striking about this co-existence is that we have a description of the heavenly King Daijavan's Asvamedha sacrifice in *Rigveda* III, 53,11.

उप प्रेत कुशिकाश्चेतयध्वमश्वं राये प्र मुञ्च ता सुदासः ।

राजा वृत्रं जङ्घनत् प्रागपागुद् गाथा यजाते वर आ पृथिव्याः ॥

"Come forward, Kushikas, and be attentive, let loose Sudas's horse to win him riches. East, west, and north. let the King slay the foemen, then at earth's choicest place perform his worship."

Leaving aside the question for a moment, whether or not there is history in the vedas, it is clear that the detailed procedure of this *Asvamedha* sacrifice referred to in the Rigveda III,53,11, is given in the Yajurveda, the veda of Yajnas.

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A searching scrutiny of the description of yajnas in the *Rigveda* leaves no room for doubt about the co-existence or rather preexistence of *Yajurveda* and *Samaveda*.

The Second Aspect

Age and Contents of the Atharva Veda :-

(a) It is believed by one school of thought that the *Atharvaveda* does not represent the advanced religious beliefs and contemplations of the priestly class and it is only a collection of popular spells and charms directed mainly against hostile agencies like diseases, demons, wizards etc. etc.

As such, it does not belong to the same period in which the *Rigveda* was revealed, but is much posterior to the age of the *Rigveda*. It is also believed that "some portions of the *Atharvaveda* are of a very remote period although some portions are of a very much later age even after the tenth book of the Rigveda was brought out."

(*Journal of the American Oriental Society Vol. III. p, 155*) The bone of contention lies in the contents of the *Atharvaveda*, and both the schools of thought are divided in their opinion. While the one school holds that the *Atharvaveda*, is full of theosophic literature, and is known as *Brahma-veda*, the other school vehemently denounces it as the dreadful cry of the prehistoric primitive man. While according to *Gopatha Brahmana*, the *Atharvaveda* contains the highest and supreme knowledge known as Brahmavidya. Griffith takes it as a mere book of sorcery and thus observes: "In the Rik there breathes a lively natural feeling, a warm love for Nature while in the Atharva, there prevails on the contrary, only an anxious dread of her evil spirits and their magical powers. In Rik we find the people in a state of austerity and independence, in the Atharva, we see it bound in the fetters of the hierarchy and superstition."

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And also according to Dr. Radhakrishnan, "The religion of the Atharvaveda is that of the primitive man, to whom the world is full of shapeless ghosts and spirits of death; when he realises the helplessness of his own existence so constantly subject to death, he makes death and disease. failure of monsoon and earthquake, the playground of his fancy." (*Indian Philosophy* Vol. I)

The Atharvaveda is mentioned in the Purushasukta (Rig. X, 90) of the Rigveda. It is mentioned again in Rig. I, 83,5,

यज्ञैरथर्वा प्रथमः पथस्तते ततः सूर्यो व्रतपा वेन आजनि

It is again mentioned in Rig. VI, 16,13

त्वामग्ने पुष्करादध्यथर्वा निरमन्थत

मूर्ध्नो विश्वस्य वाघतः

and again in Rig. X, 21.5,

अग्निर्जातो अथर्वणा विदद्विश्वानि काव्या ।

If the *Atharvaveda* had been posterior to the *Rigveda*, there could obviously be no mention thereof in the text of the Rigveda itself. So the view that the *Atharvaveda* is posterior to Rik, is untenable.

The mention of the Soma ritual in the Atharvaveda has raised a doubt in some quarter, as to the age of this veda. It is believed that the inclusion of the Soma ritual is entirely foreign to the spirit of the *Atharvaveda* and it was included in the veda to bring it in line with the sacrificial trend and ceremonial of the other vedas.

Nothing can be farther from truth than to hold that the Soma ritual was a deliberate addition at a later period. The *Atharvaveda* is as complete in its variety and profundity as the other vedas. and does indisputably belong to the age of the Rigveda.

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(b) As regards the contents, it is fundamently clear that the *Atharvaveda* has not the least reference to charms and spells. In the words of Prof. Macdonell "it is the oldest literary. monument of Indian medicine," and we shall see later that the words यातुधान, दुर्णामा, राक्षस, etc. occuring in the *Atharvaveda* are wrongly understood as referring to spies, ghosts and demons while actually they are different types of germs that infest the atmosphere, and to remedy their infection, the *Atharvaveda* provides cures in the form of medicinal herbs.

The style, no doubt, in the interrogation to the life less beings, for example, "O Leprosy, you go away" is peculiarly vedic. It need not raise any doubt that Leprosy was an evil spirit, to exorcise which the spells areenumerated in this veda. Those who are familiar with *Nirukta VII*, 7 will appreciate that this style of address is popular in the vedic literature.

In a textual matter of 20 kandas divided, into 730 suktas (portions) with a total of 5977 mantras which the *Atharvaveda* represents. we have, apart from the hymns to ward off physical and mental and psychological ailments, cosmogonic and theosophic hymns to Goddess Earth, in that famous पृथ्वीसूक्त (*Atharva*. II,12), prayer to the Sovereign Power (*Atharva* XIII,1) prayers for harmony in assemblies of the Governments (*Atharva*. VI, 73. VI. 42, II, 27, VII, 12,3) etc. etc. There is also a mention of the political rites relating to the inauguration of emperors.

As Prof. Macdonell observes, "But with regard to higher religious ideas relating to the gods, it represents a more recent and advanced stage than the Rigveda. It contains indeed more theosophic matter than any of the other samhitas. For the history of civilization, it is on the whole, more interesting and important than the Rigveda itself."

The oldest name of the *Atharvaveda* as is found in the

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beginning of the manuscripts themselves is *Atharvangirasa* अथर्वाङ्गिरस: which comprises two ancient families of priests viz, the Atharvas & the Angirasa. It is also called Bhrigu-Angirasa in some manuscripts.

[It is interesting to note here that Prof. Bloomfield takes *atharvas* as a term synonymous with holy charms" and *angirasa* as synonymous with "wich craft."]

* * *

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CHAPTER III

Atharvaveda as a Veda of Charms and Spells—Western Criticism Answered

We have seen in the previous chapter that according to the western school of thought, the *Atharvaveda*, which was known as *Brahmaveda* in the oldest Indian traditions, has been interpreted as the veda of spells and charms, a veda which contains the "whole series of magic, incantations and exorcisms." Prof. Winternitz thus makes his observations on this veda :—

"The Brahmanas, however, were from the beginning much practical a people to have used the magic charms always only in the interests of kings or other people, and not also for themselves. Among the magic incantations belonging to the "king's rites", we already find a few lines which are concerned more with the purohits, the indispensable family priest of the king, than with the latter himself. And although attacks on witchcraft and exorcisms are not lacking in brahmanical literature, yet the lawbook of Manu (XI, 33) says clearly and distinctively : 'without hesitation, the Brahmana shall make use of the sacred texts of the Atharvaveda ; the word, indeed, is the weapon of the Brahmana ; therewith may he kill his enemies.' Thus also in the *Atharvaveda* we find a whole series of magic incantations and exorcisms in the interest of the Brahmanas. In these hymns the inviolability of the Brahmanas and their possessions

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is repeatedly emphasized in the strongest manner, and the heaviest curses are pronounced against those who assail the property and lives of the Brahmanas."

(*History of the Indian Literature-p. 147*)

According to Prof. J.N. Farquher, "We have already seen that a number of spells for use in magic are contained in the Rik. The character of these poems proves that the old-world incantations which the Aryans, in common with other Indo-European peoples, had been accustomed to use had in the main at least, given way before a new type of spell, written in polished language and metre, on the model of the hymns to the gods. Doubtless, hundreds of these were being used by sorcerers, exorcists, and magicians, although only a few found their way into the hymn-books of the priests; and the process of composition continued after the canon of the Rigveda was closed. The incantation-priest had no lack of wealthy clients ready to pay well for his magic acts and poetical charms instinct with supernatural power. Hence, numerous hymns from the Rigveda were turned to these purposes; philosophic poems were perverted to more mysterious uses, their sounding phrases and incomprehensive concepts rendering them most formidable to the ear; and many new incantations were composed to fit into the detailed ritual of magic, both black and white. The man who muttered charms was usually summoned also to do the priestly duties in the domestic ceremonies, which were observed at the time of birth, marriage, death and such like.

Then, during the period of the Brahmanas, a school was formed for the training of this class of priests and quite naturally a great collection of these incantations was made the text-book of the school. This text-book is the *Atharvaveda*. It has come down to us in two recensions, named Saunakiya and

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Paippalada."

(*An Outline of the Religious Literature of India-p. 23*)

According to Prof. Macdonell, "the hostile charms it contains are directed largely against various diseases or the demons which are supposed to cause them. There are spells to cure fever (takman), leprosy, jaundice, dropsy, scrofula, cough, opthalmia, baldness, lack of vital power, fractures and wounds, the bite of snakes or injurious insects, and poison in general, mania and other ailments." (*Sanskrit Literature, p-196*).

Answer to the Western Criticism :-

Before dealing with the distorted interpretation that has been placed on certain terms, which actually imply germs and microbes, but which are wrongly taken to imply demons and spirits, we may quote Morris Jastrow and appreciate what he says about these demons and spirits and the incantations of the priests to drive them out.

Dr. Osler quotes him thus in his. *The Evolution of Modern Medicine*, at p. 17 "These demons, invisible to the naked eye-were the precursors of the modern 'germs' and 'microbes' while the incantations recited by the priests are the early equivalents of the physicians' prescriptions. There were different incantations for different diseases, & they were as mysterious to the masses as are the mystic formulas of the modern physician to the bewildered, yet trusting patient. Indeed, their mysterious character added to the power supposed to reside in the incantations for driving the demons away. Medical remedies accompanied the recital of the incantations, despite the considerable progress made by such nations of hoary antiquity as the Egyptians and Babylonians in the diagnosis and treatment of common diseases, leading in time to the development of an extensive pharmacology. So long as the cure of disease rested with the priests, the recital of sacred formulas, together with rites that may be conveniently grouped under the

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head of sympathetic magic, was regarded as equally essential with the taking of the prescribed remedies."

1. The Significance of the term कृत्या in the Atharvaveda

This word is often used in the *Atharvaveda* but it has nothing to do with magic spells as is erroneously believed by some. कृत्या is an appliance to kill the enemy कृञ, हिंसायाम् the verb कृ, used for 'killing'. In his *Arthashastra,* chapters 150-152, Kautalya has made a reference to कृत्या, saying that the learned people who are advisors to the king should urge the king to make use of कृत्या i. e. weapons to kill the enemy and अभिचार i. e, weapons which pierce through the body of the enemy and eat it up. (*cf.* चर भक्षणे)

Chanakya says :

पुरोहितपुरुषा : कृत्याभिचारब्रूयु :

Keeping in view this *modus operandi* adopted in the *Atharva-veda,* we shall now examine some of the terms which have been unfairly interpreted by a group of scholars.

All references to कृत्या in the *Atharvaveda* should be interpreted in the light of the above implication. Compare also.

ते मे देवाः पुरोहितः प्रतीचीः
कृत्या प्रतिसरैरजन्तु ॥

(*Atharva.* VIII, 5, 5)

So may these gods whom I have set before me oppose with Kritya and banish enmity !

These कृत्या weapons contain powder, stones, knives etc. and may be compared to modern bombs as we find a reference in *Atharvaveda* IV, 18, 3.

अभी कृत्या पाष्मानं ॥ यस्तेनान्यं जिघांसति ॥
अइमानस्तस्यां दग्धायां ।
बहुलाः फट क्रिक्रति ॥

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"With the sharp sound of many stones, the weapon makes a cracking noise when set upon the enemy to kill him."

The कृत्या are like the fire-missiles

या: कृत्या आङ्गिरसोर्या :
कृत्या आसुरीर्या: ।
कृत्या स्वयं कृताया चान्येभिरामृता: ॥

(*Atharvaveda* VII I, I)

आङ्गिराड ह्यग्नि : (*Shatapatha Brahmana* I, 4, 1, 25)

आसुरी कृत्या are those which proceed in a gaseous form unseen.

2. The Significance of the Term अभिचार

अभिचार relates to food poisoning or to the weapons which pierce through the body of the enemy. It has nothing to do with magic charms, A caution is indicated in *Atharvaveda*, VIII. 2, 26, to guard against poisoned food served by relations.

परित्वा पातु समानेभ्योभिचारात् सबन्धुभ्य :.....

'Let it preserve thee from thy equals from food-poisoning (from incantation, according to Griffith) from thy relations.

Atharvaveda X, 3, 7, gives a remedy against such poisoning of food, by suggesting वरणमणिबन्धन What is वरण ? This is no magic spell nor does it imply use of any gem. Let us examine the verse :

अरात्यास्त्वा निर्ऋत्या अभिचाराद् भयात् ।
मृत्योरोजीयसो वधाद् वरणो वारयिष्यते ॥

(*Atharva.* X, 3, 7)

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Griffith translates it thus :—

From mischief, from malignity, from incantation, from alarm, from death, from stronger foeman's stroke, Varuna will guard thee well.

वरण means 'Protection', for example, the remedy against food poison suggested in *Sushruta*. I, 18 is

हृदयावरणं नित्यं कुर्याच्च मित्रमध्यगः

and so in *Charaka*, chapter 23, verse 44, on food poisoning

आदौ हृदयंरक्ष्यं तस्यावरणं पिवेद्यथालाभम् ।

It is abundantly clear, therefore, that the western scholars have not done due justice to the interpretation of the few words like Apsara, Gandharva, Yatudhana, Rakshasa etc. which are actually various types of germs and which have been taken to mean demons and ghosts. There are no charms, and there is no magic, implied in these terms.

3. The Siginficance of the Terms, Yatudhans and Kimidin:-

Commenting on *Atharvaveda* 1,7, Prof, Griffith writes :-

"The hymn is a prayer to Agni and Indra for the direction and destruction of evil spirits." (I, 7)
"The hymn is a continuation of Hymn VII. The sacrifice has proved effectual, and a *Yatudhana* or sorcerer has been forced to come forward and confess". (I,8)

इदं हविर्यातुधानान् नदी फेनमिवावहत्

य इदं स्त्रीं पुमानकरिह् सस्तुवतां जनः

अयं स्तुवान आगमदिमं स्मप्रति हर्यत ॥

Hitney gives the heading of this hymn as "Sorcerers" holding, that this hymn is a prayer to Agnito get rid of sorcerers,

The two hymns refer to यातुधान Yatudhana, which according to Griffith is one of the class of evil spirits,

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demons or sorcerers explained by Sayana as Rakshasas.

स्तुवानमग्न आ वह यातुधानं किमिदिनम्
त्वं हि देव वन्दितो हन्ता दस्योर्बभूविथ ॥

(*Atharva.* I,7,1)

'Bring the Kimidin hither, bring the Yatudhana self-declared. For Agni, God, thou, lauded, hast become the Dasyu's slaughter. (Griffith)

The correct meaning is now explained thus.

The *Kimidin* is one of the class of malignant spirits. *Nirukta* VI, *11* explains it to mean 'one who moves about crying, "किम इदानीम्" Kim Idanim, or what now ? or किमइदम् what this ? यातुः is one who inflicts pain, and its distortion (अपभ्रंश) is जादू hence, this word has been wrongly connected with magic. यातुधानाः यातना दुखं तं दधति ते यातुधानाः which inflict pain.

राक्षस is a kind of worm that moves at night and kills the lonely man. One should beware of it.

रक्षो रक्षितव्यमस्माद्
रहसि क्षणोति इति वा
रात्रौ नक्षत इति वा

(*Nirukta* IV, 18)

किमीदी = किमिदानीमिति चरते

(*Nirukta* VI, 11)

"moving with a will to sting."

The derivation of other words is similarly simple. For example, गन्धर्वः = गां वाणीं धारयतीति "worms which sing, as it were, like mosquitoes".

अप्सरा = अप्सारिणी भवति (*Nirukta* V, 13) i.e. germs which breed in water,

These terms will be explained in detail, later on.

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4. Other Terms Explained :—the Bhuta, Preta, Rakshasa etc. etc.

Atharvaveda IV, 37, is full of a mention of ghosts and demons as the erroneous view goes, But the error becomes apparent when we examine that the words भूत, प्रेत, राक्षस, गन्धव do not mean 'ghosts, demons and sorcerers' but they mean only the "poisonous germs" which cause disease and these are destroyed by the fumes of हींग, सरसो, तुलसी, गुग्गुल. These medicinal herbs are also mentioned in the *Atharvaveda*. According to *Raja-Nighantu*, हींग is called रक्षोघ्न killer of demons" and *Dhanowantri Nighantu* gives a synonym of हींग as जन्तुघ्न 'killer of germs. हींग is also called भूतनाशिनं हिङ्गु 'killer of spirits'. The ayurvedic Nighantus are full of references and classification of these medicinal herbs, as killer of germs, which go by the name of राक्षस, भूत, प्रेत, गन्धर्व etc. etc.

The Germs called Rakshasas:-

Let us now examine the word राक्षस् and find out its exact meaning in Ayurvedic texts, राक्षस् is surely not a demon as is misinterpreted by some.

असृग्भाजानिह वैरक्षांसि—कौ० १७/४

the blood sucking germs are called Rakshasa-

रक्षो रक्षितव्यमस्मात् (*Nirukta* IV, 18)

Rakshasa is that type of germ from which one has to protect oneself. It is the Sun alone which can kill these Rakshasas. As the *Shatapatha Brahmana* 1,3,4,8, puts it: सूर्यो हि नाष्ट्राणां राक्षसामपहन्ता. Surely the sunlight has nothing to do with the killing of the mighty demons, if they are understood in the form of horrible, gigantic beings.

Similarly these rakshasas can be killed by *fire* also. अग्निर्वै ज्योती रक्षोहा (*Shatapatha Brahmana* VII, 4,1,34)

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and again in the same *Brahmana* 1,2,1,6, अग्निर्वै रक्षसामपहन्ता

The *Kaushitaki Brahmana* of the *Rigveda* in VIII. 4,10. 3 affirms that fire kills these germs known as Rakshasas.

अग्निर्वै रक्षसामपहन्ता

By hydropathy or water treatment also these germs are killed. It is therefore, said in *Taittiriya Brahmana* III, 2 3, 12

आपो वै रक्षोघ्नी

आसुराः are those germs which take away the very life blood.

असुं प्राणान् राति आददाति इति

5. The Word पिशाच (Pishacha) Clarified :-

This word is derived as पिशित+अश meat eater and its dictionary meaning is 'meat eater,'

पिशितं मांसमश्नातीति पिशाचः one eating meat is called Pishacha (*Shabdakalpal druma*) and according to *Vacaspatikosha* पिशितं मासमाचामतीति पिशाचः i.e. "one who eats or licks meat."

An internal evidence from the *Atharvaveda* itself will make clear that the *Pishacha* is no other than a worm.

यदस्य हृतं विहृतं यत् पराभृतमात्मनो जग्धं यतमत् पिशाचैः
तदग्ने विद्वान् पुनराभरत्वं शरीरे मासमसुमेरयामः ॥

(*Atharv.* V, 29,5)

It is a prayer to Agni, to supply the part of the flesh to body which has been eaten up by flesh-eating germs or skin diseases. Griffith has translated it thus: "Whatever of his body hath been taken, plundered, borne off or eaten by Pisachas, this Agni, knowing it, again bring hither ! We give back flesh and spirit to his body." (*The Atharvaveda*-p. 237)

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The invocation to Agni has been made, because Agni kills germs.

अग्ने हंसि न्यत्रिणं दीद्यन्

(*Rigveda* X, 118,1)

Agni, refulgent among men, thou slayest the devouring fiend (germs). Agni kills the germs called *Rakshas*

अदाभ्येन शोचिषऽग्ने रक्षस्त्वं दह

(*Rig veda* X, 118,7)

O Agni, burn the Rakshasas with thine unconquerable flame ! (Griffith)

सर्वेषाञ्च क्रिमीणां.....दहाम्यग्निनामुखम्

(*Atharva.* V, 23,13)

'I destroy all germs by means of fire'.

प्रति दह यातुधानान् प्रतिदेव किमीदिनः

प्रतीचीः कृष्णवर्त्तने सं दह यातुधान्यः ॥

(*Atharva.* 1.28,2)

O Agni, burn these germs called यातुधान, these called किमीदिन Kimidina; burn all female Yatudhana germs.

6. The Term 'Durnama' (दुर्णामा) Explained.

Atharvaveda VIII, 6 makes a specific mention of Rakshasa and Pishacha. Let us examine the first verse of this hymn wherein we find the word *durnama* दुर्णामा mentioned

यौ ते मातोन्ममार्ज जातायाः पतिवेदनौ

दुर्णामा तत्र मा गृधदस्मिंश उत वत्सपः ॥

(*Atharva.* VIII,6,1)

"Let neither fiend of evil name *Durnama, Alinsa, Vatsapa* desire thy pair of husband wooers which thy mother cleansed when thou wast born." (Griffith)

Now what is दुर्णामा?

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According to Yaskacharya it is a kind of worm which lives on raw flesh.

दुर्णामा क्रिमिर्भवति पापनामा

क्रिमिः क्रव्ये मेद्यति

(*Nirukta* VI; 12)

7. The Word Apsara (अप्सरा) Explained :-

This word does not denote any nymph, but it is the name given to those insects which live on fragrant flowers, and are called रोगोत्पादक क्रिमि

गन्ध इत्यपसरस उपासते

(*Shatapatha Brahmana* X, 5,2,20)

8. What is Gandharva ? The *Shatapatha Brahmana* clarifies those insects which are attached to beautiful things. Therefore, speaking for both. the Shatapatha Brahmana holds that the *Apsaras* are worms of fragrance and *Gandharvas* are worms of beauty.

अथो गन्धेन च वै रुपेण च

गन्धर्वाप्सरसश्चरन्ति

(*Shatapatha* IX; 4,1, 4)

According to one view अप्सरस् is a class of those malarial germs which flourish on water in marshy places and गन्धर्वा 's refer to the singing mosquitoes. So both the apsarsas and gandharvas are mosquitoes of malaria which dirty water breeds.

9. The Term कश्यप *Kashyapa*

In *Atharvaveda* II, 33,7, we read

यद्दमं त्वचस्यं ते वयं कश्यपस्य वीवर्हेण विश्वञ्च विवृहामसि

"We with the exercising power of Kasyapa drive far away consumption settled in thy skin."

What is कश्यप ?-it is a type of a deer

कश्यपः मृगविशेषः (वैद्यक शब्द सिन्धुः)

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The deer skin is known to cure so many ailments. According to *Shata patha*, Kanda seven, Chapter five the word *Kashyapa* means 'vital breath'.

कश्यपो वैकूर्मः प्राणो वैकूर्मः

Kashyapa is Kurma and Kurma is Prana (breath). It is called Kurma (lit, a tortoise) because its seat in the naval of the human body is of the resemblance of a tortoise.

10. Magic Spells :-

इन्द्रजाल is the name for magic. We find it mentioned in *Atharvaveda* VIII, 8, 17 and VIII,8, 18.

वृहत् ते जालं वृहत् इन्द्र शूर
सहस्त्रार्धस्य शतवीर्यस्य।
तेन शतं सहस्त्रमयुतं न्युर्बुदं
जघान शक्रो दस्यूनांमभिधायसेनया ॥

"Great is thy net, brave Indra, thine the mighty match for a thousand; Lord of Hundred Powers" (Griffith)"

इन्द्रश्चाचुजालाभ्यां शर्व सेनाममूं हतम्

(*Atharva*. VIII, 8, 18)

"with your entangling snares and nets Sarva and Indra, slay that host. (Griffith)

This contrivance of इन्द्रजाल is used for creating confusion in the army by the use of electric mechanism, lightning etc., There is no illusion or fraud. The effect is also not brought about merely by the chanting of a mantra as is crroneously understood, *Indrajala* is a particular type of electric mechanism used in warfare. *The Tantra*—This is a scientific method of controlling the various faculties and thereby curing ailments. The *mantra* is connected with psychotherapy and is perfectly scientific. and under this category fall hypnotism and mesmerism.

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11. Psycho-therapy मन्त्र विद्या

(a) The *Atharvaveda* abounds in references to curing of diseases by the exercise of will-power; because according to *Atharvaveda* XIX, 52,1, will power is the very essence of the mind.

(कामस्तदग्रे समवर्तत मनसो रेतः . .....)

There is no sorcery in it, but it is a scientific approach to the problem of diseases. It is a truly said, 'a peaceful mind generates power.' The mind has to be enriched with vital thoughts, to ensure a rich and strong body.

"The influence of the mind and brain," says Combe, "over the action of the heart and lungs is familiar to most persons, as sighing, palpitation and fainting, so often witnessed as consequences of emotions of mind, are evidences which no body can resist, and death itself is not a rare result in delicately organised persons."

James Coates observes. "In cases of self-healing by autosuggestion, it is the diversion of the mind from unpleasent and unhealthy subjects which arrests the course of disease and brings about the immediate cure, this change affecting the internal direction of the vital or nervous force."

(*Human Magnetism-p.* 111)

Let us examine some of the verses in the *Atharvaveda* wherein this method of will-power is applied in overcoming ailments.

परो पेहि मनस्पाप विमशस्तानि शंसति . .....

(*Atharvaveda* VI,45,1)

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'Sin of the mind, avaunt begone! why sayest thou what none should say.' (Griffith)

And again, कृतं मे दक्षिणे हस्ते जयो मे सव्य आहितः

(*Atharvaveda* VII 50.8)

"My right hand holds my winnings fast and in my left is victory." (Griffith)

To get valour by increasing will power is enjoined in a verse of the *Rigveda.*

वृषा ह्यसि राधसे जज्ञिषे
वृष्णि ते शवः

(*Rigveda* V,35,4)

"Mighty to prosper us wast thou born and mighty is the strength, thou hast." (Griffith)

अग्ने यन्मे तन्वा अनंतन्मऽआपृण (*Yajurveda* III. 17) is a prayer to Agni to supply all that is wanting in me." (*Wilson*) which is the same as

अपेहि मनसस्पतेपक्राम परश्चर :

(*Atharva.* XX, 96, 24)

"Avaunt, thou Master of the Mind! Depart and vanish far away." (Griffith)

Atharvaveda III, 22, 1. holds thus :

हस्तिवर्चसं प्रथतां वृहद्यशो अदित्या यत्
तन्वः सम्बभूव—

and in this mantra guarantees elephants' power, by the mental yoga, just as Patanjali in *Yoga-Sutra* IV, 24, बलेषु हस्तिबलादीनि assures the yogi, the power of an elephant, by concentrating on the valour of an elephant.

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(b) **Healing by Touch.** This is a part of the science of Mesmerism which was introduced in Europe by Mesmer, but the sages knew this science since the age of the vedas. We have a reference to this application in *Atharvaveda* IV, 13, 6.

अयं मे हस्तो भगवानयं मे भगवत्तर :

अयं मे विश्वाभेषजोऽयं शिवभिमर्श न :

"Felicitous is this my hand, yet more felicitous is this, This hand contains all healing balms, and this makes whole with *gentle touch.* (Griffith)

Again दक्षं त उग्रमाभारिषं परा यक्ष्मं सुवामि ते

(*Atharvaveda* IV, 13, 5)

"I bring the mighty strength, I drive thy wasting malady away." (Griffith)

Referring to the power of healing by touch, the *Atharvaveda* further holds

हस्ताभ्यां दशशाखाभ्यां जिह्वा वाच : पुरोगवी

अनामयित्नुभ्यां हस्ताभ्यां ताभ्यां त्वाभि मृशामसि

(*Atharvaveda* IV, 13, 7)

The tongue that leads the voice precedes

Then with our tenfold branching hands,

With these two healers of disease; we

Stroke thee with a soft caress, (Griffith's translation).

A strange experience of this phenomenon of "touch" is narrated in the life of Vivekananda. He once said to Swami Rama Krishna, "Even if millions of men believe in God, I will not say, I believe, if I have not proved it myself." But Ramakrishna never

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wavered in his love for him and in a mood of semi-consciousness he *touched* Narendra. As T. L. Vaswani puts it: "A sudden change came upon him. The effect on him of western *rationalism* was overcome. Naren no longer denied God. Naren passed through a series of mystic experiences, crying again and again, Shiva, Shiva".

(*The Voice of Vivekananda*—p. 21)

As Dr. Mitra puts it, "The success of psychotherapic treatment depends on an exhaustive and careful study of sub conscious cerebration, the cornerstone of psychotherapy. Europe and America recognized this all-important mental function so late as 1876. Western scientists have had scarcely time enough during the last fifty years to build up anything like a science of psychotherapy; whereas Hindus who discovered subconscious cerebration about thirty centuries ago, have practised drugless mental healing ever since that distant age".

(*Some Aspects of Hindu Medical Treatment*, p. 23)

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CHAPTER IV

The Origin, History, and Theory of Indian Medicine

The longevity of man's life to hundred years जिजीविषेत् शतं समा:— (*Yajurveda* XL, 2) or even more, जीवेम शरद: शतम्-भूयश्च शरद: शतात् must be maintained according to vedic teachings.

And how that span of life can be attained, is given in the Ayurveda, the science of life, with all its thereuptical hints and prescriptions given in the *Atharvaveda* in a nucleus form. The extent and object of introducing medical knowledge, therefore, in the *Atharvaveda* is abundantly clear.

The sage Dhanvantari tells Sushruta that this science of medicine should be studied for the sake of affording relief from suffering to humanity in its pursuit of happiness, for the sake of prolonging our own lives and for the sake of general good of the people.

According to sage Kashyapa, 'medicine should be studied by the Brahmana for the sake of the knowledge of truth, of acquiring spiritual merit for himself and of extending help to humanity, by the Ksatriya for the

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sake of safeguarding the health of the people, by the Vaisya for the sake of a livelihood and by the rest for the sake of service. All may study it for the sake of living the good life.' (*Kashyapa Samhita*, 42)

Origin of Medicine

"*Medicine arose out of the primal sympathy of man with man, out of the desire to help those in sorrow, need and sickness.* —*Osler*

Dr. Payne, the eminent medical historian remarks, "The basis of medicine is sympathy and the desire to help others and whatever is done with this end must be called medicine."

The purpose of introducing medicine in the *Atharvaveda* is spiritual as well as secular, as it purports to deal with that

"Primal sympathy,
Which having been must ever be
In the soothing thoughts that spring,
Out of human suffering."

Tracing the origin of medicine Zimmer writes that "out of the sphere of time less existence—which underlies and weaves together the ever-present reality of extra-human forces with the laws that pervade the temporal and phenomenal web of the universe and man's existence—medical wisdom steps into the range of man's vision in the garb of historical tradition."

(*Hindu Medicine*, p. 88)

The starting point of this tradition is the intuitive insight and the primary essence or the nucleus

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of it is "realized through an introverted awareness of the elements and laws that constitute the fact of life and the characteristics of living beings, the interrelation of the many and various data of the life-process" (*ibid*. p. 89).

Medieal Instinct Has no Beginning. It is as beginningless as life itself, and in tracing the origin of medicine as an attempt to trace origin of life itself, we can only exclaim:

को ददर्श प्रथमं जायमानं
अस्थन्वन्तं यदनस्था विभर्ति ।
भूम्या असुर सृगात्मा क्व स्वित्
को विद्वांसमुपगात् प्रष्टुमेतत् ॥

(*Rigveda* I, 164,4)

"Who beheld Life, when it first arose ?-life that formless in itself, fills all forms. From earth are fashioned blood and breath but whence the spirit that informs these ? Who has gone to the ultimate Knower of all things to put the question?"(Griffith's translation)

Source of Medicinal Knowledge

The source of medicinal knowledge is inherently intuitional, and has a suggestive and empirical link of ideas, with vigilant observations followed by an ever-widening experience.

Tracing the source of medicinal-knowledge, Sir William Osler observes, "The first lessons came to primitive man by injuries, accidents, bites of beasts and serpents, perhaps for long ages, not appreciated by his

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childlike mind, but little by little, such experiences crystallised into useful knowledge. The experiments of nature made clear to him, the relation of cause and effect, but it is not likely, as Pliny suggests that he picked up his earliest knowledge from the observation of certain practices in animals as the natural phlebotomy of the plethoric hippopotamus, or the use of emetics from the dog, or the use of enemata from the ibis."

(*The Evolution of Modern Medicine-p.7*)

Edward Berdoe in his *Popular History of Medicine* refers to the instinctive use and knowledge of valerian by the cats, antidotal herbs for snake-poison by the mongoose, of plantago major by the toad, of salt by the cow, buffalo, horse and camel. In the *Atharvaveda* we have a mention of the animals and birds from whom the use of healing herbs and drugs could be learnt.

वराहो वेद वीरुधं नकुलो वेद भेषजीम्
सर्पा गन्धर्वा या विदुस्ता अस्मा अवसे हुवे ।

(*Atharvaveda* VIII, 7,23)

"The boar knows the plant, the mongoose knows the remedial herb. What the serpents, the gandharvas know, those I call to aid."

Again in the *Atharvaveda* VIII, 7,24, we have

याः सुपर्णा आङ्गिरसीर्दिव्या या रघटो विदुः
वयांसि हंसा या विदुर्याश्च सर्वे पतत्रिणः
मृगा या विदुरोषधीस्ता अस्मा अवसे हुवे ॥

"What herbs of the angirasas, the eagles know, what

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heavenly ones the Raghatas know, what ones the birds, the swans know, and what all the winged ones know, what herbs the wild beasts know-I call them to aid. Again,

यावतीनामोषधीनां गावः
प्राश्नन्तिऽघ्न्या यावतींनामजावयः
तावतीस्तुभ्यमोषधीः शर्म यच्छन्त्वाभृताः ॥

(*Atharvaveda* VIII, 7,25)

"Of how many herbs, the inviolable kine partake, of how many the goats and sheep, let so many herbs, being brought, extend protection to thee."

It is in such associations, that we find the origin of rational medicine, of the healing art, with a four fold classification of vedic therapy which is alluded to in the *Atharvaveda* XI,4,16.

The four kinds of remedies that protect life are enumerated here viz.

(1) The drugs of the Angirasas (Juices of plants and herbs)

(2) The drugs of the Atharvans (a part of the mantra-therapy.)

(3) The divine drugs in the form of prayers and mental yoga.

(4) The drugs of human artifice and contrivance.

Vedic Medicine and the Modern Doctrine of Signature

In the growth and development of medicine, by observation, knowledge, reason, and self consciousness of man, the *Doctrine of Signature* also has played a guiding role. As Sir Osler puts it, "The association

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of ideas was suggestive-the plant eyebright was used for centuries in diseases of the eye because black speck in the flower suggested the pupil of eye. The old herbals are full of similar illustrations upon which indeed the so-called doctrine of signature depends." (*The Evolution of Modern Medicine*-p. 7)

The colour, texture or the shape of things in plants, or animals were taken as the guiding factor in indicating the usefulness of those plants or animals as remedies or as replenishing agents. In other words, those substances which could tinge the fluids bright red, were utilized as blood tonics or in checking hemorrhages.

Milk and other substances of its colour were utilized in the promotion of the body elements of similar colour, for example, the semen or the protoplasmic cell fluid.

The *Atharvaveda* mentions turmeric (हल्दी) and yellow-birds into which jaundice is charmed to enter, thus, curing the human patient of that disease.
उरो मत्वा क्षतं लाक्षां पयसा मधुसंयुताम् सद्य एव पिबेज्जीर्णे पयसा उद्यात् सशर्करम् ।

(सूत्र 15 च. चि. 11)

In the days of Hippocrates, it was believed that dryness was expelled by moisture; cold by heat etc. This was the *doctrine of contraries* but in a later development in the art of healing, the *doctrine of similars* on which is based the mode of treatment

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called *Homeopathy* was introduced. This is close to the doctrine of signature according to which, the use of eyebright is advocated in diseases of the eye and cyclanen in diseases of the ear because of its resemblance to that part, and the Egyptian or ganotherapy had the same basis-spleen would cure spleen, heart, heart etc (Oslar, *The Evolution of Modern Medicine* p. 140)

Atharvaveda and the History of Medicine

The history of medicine in India is shrouded in mystery. It is not too much to say that the mists of Time have rolled over the beginnings of the endeavours of Man. There is, therefore, a very scanty material available and according to some historians, nothing is known for certain before Alexandrian invasion (326 B. C.) or at any rate before Buddhist period (7th century B. C.). There are no definite date to fix up the chronology and the biographical structure of the great sages, seers, surgeons and acharyas who have played eminent part in contributing to the knowledge on Indian medicine.

In fact Max Muller's observations on the History of Philosophy in India apply, equally well to the History of Medicine.

According to him,

"From the actual works themselves written by the poets, philosophers and scientists of India, very little is to be had pertaining to the life and work of the author. Most often even the name has to be learnt

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from the colophons or such other appendages to the originals contributed by the editors, commentators and such others. The difficulties in computing the dates are augumented by the prevalence of different eras in vouge in the various parts of India."

It is equally true that foreign domination and invasions have thrown much of the literature on *medicine* into oblivion and although a great help has been rendered by the explorations of Harappa and Mohenjodaro revealing the civic and domestic life of ancient India, the system of drainage, sanitation, and roads, the inscriptions and tablets leading to the evidence of knowledge of drugs and minerals etc., very much yet remains to be discovered and integrated.

In this small treatise, we are confining ourselves to the earliest source of Indian medicine-in the vedas, particulary the *Atharvaveda*, which is an eternal source of knowledge on Indian medicine. As a writer has said very aptly, "The Atharvaveda is a compen dium of medicine in its various stages of evolution and contains the most primitive as well as highly advanced stages of therapy..... It is a record of psycho-souratic technique of healing by a combined procedure of charms, prayers, incantations, amulets and drugs."

(*The Caraka Samhita* published by Shri Gulab Kunverba Ayurvedic Society-Vol. 1, p.19)

That the Indian medicinal system had reached its peak in the olden times cannot be doubted,

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What was the source of that knowledge? It was nothing but the nucleus form provided by the *Atharvaveda* and later expanded and explored in the *Brahmanas*.

As Dorothe Chaplin rightly observes:" There were good surgeons in the early days of Hindu medical science and they sometimes performed very difficult operations.

According to the great historian Sir William Hunter, "many centuries ago at the monastic medical university at Nalanda, near modern Gaya, Hindu surgeons successfully performed the operation of rhinoplasty and other feats of surgical skill. In old Hindu medical books one may find the description of that branch of surgery which deals with the improvement of deformed ears and noses and the forming of new ones, one of the scientific additions to surgery in great hospitals in the large modern cities in Europe at the present time."

(*Some Aspects of Hindu Medical Treatment-p.7*)

In the domain of surgery, it is true that the knowledge of instruments and the operations performed by old Indian physicians has become dim with the passage of time, but there are strange similarities still observable in the names of the some of the surgical instruments used now. For exanple, सिंह मुख and मकरमुख स्वस्तिक 's' are the prototypes of Lion and the Crocodile forceps of the modern physicians.

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For exhaustive details, the inquisitive student may please refer to the *Surgical Instruments of the Hindus* by G. N. Mukerjee, a Griffith prize volume of the Calcutta University.

Confining ourselves to the knowledge of surgery in the *Atharvaveda* let us turn to the hymn three, of kanda one, of the Atharvaveda.

यदान्त्रेषु गवीन्योर्यद्वस्तावधि संश्रितम्
एवा तेमूत्रं मुच्यतां वर्हिर्वालिति सर्वकम्
प्रते भिनद्मि मेहनं वर्त्रं वेशन्तिआइव
एवा ते मूत्रं मुच्यतां वहिर्वालितिसर्वकम् ॥

(*Atharvaveda* I, 3, 6, 7, et. seq.)

Here we have a mention of some tubular instrument to relieve retention of urine and in modern surgery we know Catheter and tubal instruments for dilation of urethral structure. An Indian surgeon is proud of the fact that "*Susruta samhita*, although it is available only in the fragmentary form, is the world's first book of surgical knowledge." (*Nagarjun* Vol. II, p. 19)

In the reign of Ashoka the great, the whole of India was studded with hospitals not only for men but also for the animals." (Ibid. p. 18)

All the eight branches of Ayurveda were taught in all the famous universities of ancient India viz. Nalanda, Vikramshila, Odantapuri, Valabhi, and Taxila and dissection of dead bodies was used to teach anatomy and surgery. In olden times in India, there

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were three famous schools of medicine viz. The Atreya school of medicine, the Sushruta school of surgery, and the Kashyapa school of pediatrics & obstetrics. Brahma was the first to promulgate the medical science and from him the science was learnt by Daksa, from him by Aswins and from the Aswin twins it went to Indra and then to various sages, Dhanvantri and Divadas (one view) to Kasyapa, Vasistha, Atri and Bhrigu (second view) and to Bhardwaja etc. etc. (third view).

"The recent discovery at Bogbaz Koyi in Cappadocia of the names of Nasatyas and other vedic gods in Cuneiform character, and the occurence of the name Naunghaitya ia the Zend Avesta clearly direct us to search for the medical knowledge as taught by celestial Asvins not solely in India, but also in Persia and Mesopotamia." (G. N. Mukerjee, *History of Indian Medicine*, Vol. I, p. 7)

Deserving epithets have been conferred by the scholars on the four famous physicians of ancient India

निदाने माधवः श्रेष्ठः सूत्रस्थाने च वाग्भट्टः
शारीरे सुश्रुतः श्रेष्ठः चरकस्तु चिकित्सिते ॥

Madhava is unrivalled in actiology and diagnosis, Bagabhatta in principles and practice of medicine, Sushruta in anatomy and surgery and Charaka in therapeutics.

The Usc of Injections was popular in vedic times. The sanskrit word for injections is अन्तः क्षेप or सूचीवेध We have a reference to this in *Rigveda* X, 97, 12

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यस्यौषधीः प्रसर्पथाङ्ग मङ्गं परुष्परः ।
ततो यक्ष्मं वि बाधध्व उग्रो मध्यमशीरिव ॥

The word प्रसर्पसि (penetrates) is thus derived :- प्रविश्य अन्तः शिरामुखे व्याप्नोषि referring to the needle entering the body and spreading the medicine.

Long before Jannar had discovered vaccination, Col. King had evidenced the frequent use of vaccinaions in India. This is confirmed by a statement recorded by Har Bilasa Sharda in *Hindu Superiority*. p. 260.

Dr. Huillet of Pondicherry holds the view that actual vaccination itself was known to the Hindus. (G. N. Mukerjee *History of Indian Medicine*, vol. III p. 11)

The following list of the noted physicians of the vedic time may be interesting to the reader particularly from the perspective of the history and growth of Indian medicine, which later developed into the European system of allopathy, with the use of same herbs and roots and decoctions but with different nomenclature. The oldest Hindu physicians are:

Agni (अग्निः)

Vata (वात-the wind-god)

Vrhaspati (ब्रहस्पतिः)

Ushana (उशना) or शुक्राचार्य etc. etc. as given in the *Appendix*.

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The Theory of Hindu Medicine and the Doctrine of Tridosha (त्रिदोष)

It was Paracelsus who said "Man is his own doctor, and finds proper healing herbs in his own garden, the physician is in ourselves, in our own nature are all things that we need."

Ayurveda is essentially the science of life and as Charaka holds it, the entire suffering of the mind and the body, responsible for shortening man's life is rooted in his ignorance, and the only source of happiness is a clear-cut and scientific knowledge of things.

समग्रं दुःखमायत्तमविज्ञाने द्वयाश्रयम् ।
सुखं समग्रं विज्ञाने विमले च प्रतिष्ठितम् ॥

(*Charaka* XXX, 84)

This knowledge of the physical laws of health in the triad of Vata, Pitta and Kapha, is essential for a seaker of health, just as the knowledge of the **three fold misery**, mental, physical and metaphysical in the universe is essential to ensure happiness to man according to the Sankhya school of thought.

दुःखत्रयाभिघाताज्जिज्ञासा तदपिघातके हेतौ ।

(सांख्य कारिका I)

The scope of Ayurveda, the science of life, is splendidly defined by Charaka as under:

हिताहितं सुखं दुःखमायुस्तस्य हिताहितम् ।
मानं च तच्च यत्रोक्तमायुर्वेदःस उच्यते ॥

„That is named as the *science* of life which lays

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down the good and the bad, the happy and unhappy elements and what is wholesome and unwholesome in relation to life as also its measure."

It was Descartes who said that we could be freed from an infinity of maladies both of body and mind if we had sufficient knowledge of their causes and of all the remedies with which Nature has provided us.

For centuries together, the cardinal doctrine of Tridosha त्रिदोष in India or the humoral theory of Hippocrates in the West, has been the guiding doctrine for man's health and maintenance of the life currents of his psycho-somatic constitution. These are classical principles of modern medical thought, which trace out the cause and prevention of the disease in the individual and his environment, and affirm the existence of three Dosas or essential principles which pervade all the tissues, secretions and excretions and determine health and disease. These three principles are called vata, pitta and kapha-the fundamental functionaries of the man's constitutional pathology.

Harmonious working of these three functions, is health, and any discordance and disharmony will result in disease.

The five elements in matter have been grouped into three, in this way:- air and ether being combined into *vata*, fire turned into *pitta* and water and earth combined into *Kapha*.

वाय्वाकाशधातुभ्यां वायुः ।

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आग्नेयं पित्तम्
अम्भः पृथिवीभ्यां श्लेष्मा ॥

They refer to the fluid balance, the thermal and the vital force in human organization.

Kapha is derived (from क water, फ which is synonymous with श्लेष्मा and सोमं)

फलति इति सोम एव शरीरे श्लेष्मान्तर्गतः (चरकसंहिता)

It hints at the necessity of maintaining a fluid matter in the body. *Kapha* is that cohesive force which is responsible for holding the joints together and fulfils all cohesive, nutritive and stabilizing functions and supplies living waters to the roots of life.

Pitta derived from तप्त to heat, gives an idea of the thermal force and that specific heat which is essential to be maintained in the body to digest and assimilate materials.

अग्निरेव शरीरे पित्तान्तर्गतः।

Vata, derived from वा to move, refers to the dynamic forces in maintaining that vital force which is essential for the progress of the vital processes in the body.

As Charaka testifies: Vata, pitta and kapha moving in the whole body produce good and evil effect on the entire system according as they are normal or disturbed.

सर्वशरीरचरास्तु वातपित्तश्लेष्माणः
सर्वस्मिन् शरीरे कुपिताकुपिताः

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शुभाशुभानि कुर्वन्ति ॥

(*Charaka*, Sutra XX, 9)

Hippocrates (460 B. C.), the father of Western medicine, whose keen observations have dominated the profession for twenty-five centuries, writes in the work *The Nature of Man*,

"The body of man contains in itself blood and phlegm and yellow bile and black bile, which things are in the natural constitution of his body and the cause of sickness and of health. He is healthy when they are in proper proportion between one another as regards mixture and force and quantity and when they are well mingled together. He becomes sick, when one of these is diminished or increased in amount, or is separated in the body from its proper mixture, and not properly mingled with all the others."

What happens when this pathological *vata* is disturbed.? Charaka holds,

कुपितस्तु खलु शरीरे शरीरं नानाविधैः
विकारैरुपतपति बलवर्णसुखायुषामुपघात्रताय मनोव्याहर्षयति
सर्वेन्द्रियाण्युपहन्ति विनहन्ति गर्भान् विकृतिमापादयात्यकालं
वा धारयति भयशोकमोहं हैन्याति
प्रलापजनयति प्राणां चोपरुणद्धि ॥

(*Charaka*, Sutra XII, 8)

"When, however, *vata* becomes abnormal in the body, it afflicts the organism with diverse kinds of disorders, tending to impair its strength, complexion, well being and life; it depresses the mind, impairs all the

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senses, destroys the foetus in uterrus, produces deformity in it, or unduly prolongs the period of gestation, gives rise to fear, grief, stupefaction, depression of the spirits and delirium and obstructs the vital functions."

The Indian concept of the three-dosha is the source of the humoral theory amongst the Greeks and the Romans. As Dr. Cyril Edwood observes, "This doctrine was taught in unmistakable terms in the holy books of the Hindus. From India it was carried to the Greeks by way of Persia." (*Medicine in Persia*)

It is said that this theory of three humours in the Hindu system of medicine is borrowed from the Greeks. But this assertion is not correct. As Sir Sinhjee observes, "The humoral theory of the Hindus is extraordinarily like that of Hippocrates, as may be seen by a more detailed description, but as it is spoken of in the *Rigveda*, the theory that it was derived by the Hindus from Hippocrates is untenable." (*A Short History of Aryan Medical Science*, p. 191)

Who is the Greatest Physician ?

The greatest physician recognised in the vedas is God.

भिषक् ब्रह्मा ।

(*Rigveda*. IX, 112, 1)

Brahma is the physician.

उन्नो वीरां अर्पय भेषजेभिर्भिषक्तमं त्वा भिषजां शृणोमि। ।

(*Rigveda*, II, 33, 4)

Do thou with strengthening balms incite our heroes; I hear thee famed as best of all physicians.

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Yajurveda XVI, 5, also states the same thing.
अध्यवोचदधिवक्ता प्रथमो दैव्यो भिषक् ।

The Advocate, the first Divine Physician, hath defended us.

Ashvini Kumars are considered to be the physicians of the gods. As we read in the *Aitareya Brahmana* I, 18.

अश्विनौ देवानां भिषजौ ।

and there is a prayer in *Rigveda.* VIII, 18, 8, to these physicians to be good to us.

उत त्या दैव्या भिषजा शं नः
करतो अश्विना युयुयातामितो
रपो अप स्त्रिधः॥

And may Ashvins, the divine pair of physicians, send us health. May they remove iniquity and chase our foes. (Griffith)

Who are these Ashvins ?

Nirukta XII, 1, gives a clarification in these words:
अथातो द्युस्थाना देवताः
तासामश्विनौ प्रथमागामिनौ भवतः
अश्विनौ भद् व्यश्नुवाते सर्वं रसेनान्यो ज्योतिषान्य :
अश्वैरश्विनावित्यौर्णवाभ :
तत कावश्विनौ द्यावापृथिव्या वित्येके
अहोरात्रावित्येके । सूर्याचन्द्रमसावित्येके । राजानौ
पुण्यकृतावित्यैतिहासिकाः ॥

About the surgical and therapeutic skill of the

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Ashv in-twins, the physicians of the gods, it is stated that they worked miracles, they could replace the head of a man with that of a horse. They successfully treated Pusan when his teeth had become loosened. They treated Bhaga when he had lost his eye sight and restored the hand of Indra when it had become withered. They cured Soma of consumption. When sage Cyavana, the son of Bhrigu had become paralysed on account of old age, with loss of voice, it is the Ashvini twins that made him young once again with the medicine now, popularly known as Cyavana-Prasha after the name of that sage.

वृद्धोऽपि च्यवनो युवा बभूव।

All these and many more feats of surprising variety are delineated by Charaka.

Qualifications of a Good Physician. *Atharvaveda* V, 29, 1, gives the qualifications as one

(1) who knows preparation of medicines

भेषजस्य कर्त्ता

(2) one who knows the diagnosis and the remedy before hand

क्रियमाणं अग्रे वेत्ति

It is such a physician as is expert in all ways, has good contacts with specialists and cures the ailment in its entirety.

विश्वेभिः देवैः संविदानः अस्य परिधिः पताति ॥

(*Atharva.* V, 29, 2)

A physician has, by virtue of his medicines, the

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power to increase the longevity of a person who is क्षितायु: i.e. debilitated in age

यदि क्षितायुर्यदि वा परेतो यदि मृत्योरन्तिकं नींत एव
तमा हरामि निर्ऋतेरुपस्थादस्पार्षमेनं शतशारदाय ॥

(*Atharva*. III, 11, 2)

"Though his days are ended, though he is almost departed, though brought very near death already-I bring him out of destruction's lap, and save him for life to last a hundred autumns and even of a person who is almost nearing death."

मृत्योरन्तिकं नींत एव

Such was the dexterity required of the Vedic physician.

Sushruta who was the exponent of the scientific medicine of his age insisted on a hexaphasic knowledge which the physician must study before he could arrive at a correct diagnosis of the patient's condition and behaviour. According to him,

संचय च प्रकोपं च प्रसरं स्थान संश्रयम्
व्यक्तिं भेदं च यो वेत्ति दोषाणां स:
भवेद् भिषक् ॥

(*Sushruta Sutra* 21, 36)

He is entitled to be called a physician who knows the various stages of pathogenesis viz. stage of accumulation संचय provocation प्रकोप diffusion प्रसर location स्थानसंश्रय manifestation व्यक्ति and termination भेद.

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CHAPTER V

Atharvaveda as a Literary Monument of Indian Medicine

In the words of Prof. Macdonell, "The *Atharvaveda* is the oldest literary monument of Indian Medicine."

(*Sanskrit Literature* p-196)

The Atharvaveda as the Code of Medicine.

To add to our familiarity, the *Atharvaveda* consists of twenty sections called Kandas and has come to us in nine recensions. Two recensions known as the शौनकेयः (which is the only popular recension) and the पैप्पलादः also known as the Kashmirian recension, are extant, others are lost in oblivion. The 18th Kanda is not found in the पैप्पलाद शाखा and is, therefore believed to be of a later date. It is also believed that the 20th kanda is completely borrowed from the *Rigveda* and is hence of a date later to that of the *Rigveda.*

The kandas 19 and 20 are ignored in the प्रातिशाख्य of the *Atharvaveda.* The names of the nine recensions of the *Atharvaveda* are already given in Chapter I.

In the course of our investigation of material from the medical man's point of view, we find that there are 114 hymns in this veda, which are devoted to medical subjects, in which some of the outstanding topics like fever, consumption, various wounds, leprosy and poisoning etc. etc, are mentioned.

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It is on these foundations that the later sages made researches in Ayurveda, with its eight branches and three fundamentals.

The Eight Branches of Medicine.

The eight branches of this science are given as under :-

(1) Medical Therapy,

(2) The Science of the diseases of the eye, ear, nose throat etc. i. e. of Supra-Clavicular parts.

(3) Surgery शल्यापहर्तृकं

(4) Texicology विषगदवैरोधिकप्रशमनम्

(5) Psycho-therapy भूत विद्या

(6) Pediatrics कौमारभृत्यकम्

(7) Rejuvenation रसायनम्

(8) Virilification वाजीकरणम्

We have given in the *Appendix* a list of the authoritative books on all these branches of medicine, which should be read with advantage by the progressive students and practitioners. As Sushruta observes, a doctor of medicine should be well read and be equipped with versatile knowledge to arrive at the correct diagnosis.

एकं शास्त्रमधीयानो न विद्याच्छास्त्रनिश्चयम्
तस्माद् बहुश्रुतः शास्त्रं विजानीयात् चिकित्सकः।

We shall now deal with the material on medical therapy as far as it is available in the *Atharvaveda* Samhita or other Samhitas.

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(1) Human Physiology and Anatomy in the Vedas.

The Atharvaveda X, 2 contains a complete mention of parts of the human body. It is a long list and throughout the text, we find 121 different parts of the body mentioned. The *Yajurveda,* book 25 also contains a long list of the several parts of the body, a few of which are noted below.

Teeth
Gums
Tooth Sockets
Tongue Tip
Palate
Jaws
Mouth
Fore Foot
Rectum
Entrails
Arms
Belly
Rib cartilages
Nostrils
Upper lip
Head
Frontal Bone
Lower Neck
Neck Tendonds
Knees
Shoulders etc. etc.
Large intestines
Testicles
Chest
Kidneys etc. etc.

In a nut shell we quote *Atharvaveda* X, 2 verses 31, 32, describing all outlets-the eight chakras and the nine gates of the Human Body.

अष्टचक्रा नवद्वारा देवानां पूरयोध्या
तस्यां हिरण्यय: कोश: स्वर्गो ज्योतिषाकृत:॥
तस्मिन् हिरण्ये कोशे त्र्यारे त्रिप्रतिष्ठिते
तस्मिन् यद् यक्षमात्मन्वत् तद्वै ब्रह्मविदो विदु: ॥

(*Atharvaveda* X, 2,31, 32)

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The fort of gods, (human body), impregnable with circles eight and portals nine, contains a golden treasure chest, celestial, begirt with light (31).

Men deep in lore of Brahma, know that Animated Being, which dwells in the golden treasure chest that hath three spokes and three supports. (32).

Portals nine refers to the orfices of the human body, seven in the head and two below.

II. Hydropathy in the Vedas.

Atharvaveda V1, 7, and VI. 57, are full of references to diseases wich are cured by the various uses of water and steam etc.

शं चनो मयश्चनो मा चनः किं चनाममत्
क्षमा रपो विश्वं नो अस्तु भेषजं सर्वं नो अस्तु भेषजम् ॥

(*Atharva.* VI, 57, 3)

"Let it be the health and joy to us. Let nothing vex or injure us. Let water be the universal medicine-Let all to us be balm".

AND

The *Atharvaveda* I, 4, I, 5 and I, 6 have copious references to water therapy, declaring the efficacy of water in so many words.

शिवतमः रसः	(I, 5, 2) water is the 'Essence'.
अपो मयोभुवः	(I, 5, 1) water is beneficial.
अप्सु अमृतम्	(I, 4. 4) water contains nectar.
अप्सु भेषजम्	(I, 4, 4) water is medicinal.
अप्सु विश्वानी भेषजानि	(I, 6, 2) water contains all medicinal properties.

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(i) The *Rigveda* I, 23, 9 says: अप्स्वन्तरमृतमप्सु भेषजम् and again in *Rigveda* I, 23, 20, we have,

(ii) अप्सु मे सोमो अब्रवीत् अन्तर्विश्वानि भेषजा ।

"Within the waters, Soma thus hath told me-dwell all balms". (Griffith).

(iii) आपः पृणीत भेषजम् (*Rigveda* I, 23, 21)

O waters, teem with medicine to keep my body safe from harm.

(iv) आपः पृणीत भेषजं वरूथं तन्वे मम

(*Rigveda* I, 23, 21)

Water destroys the diseases of the internal organs.

(*Rigveda* VII, 49, 2)

(v) याः शुचयः पावकास्ता आपो देवीरिह मामवन्तु

Bright, purifying, let those water goddeses, protect me.

(vi) अयद्मा अनमीवाः नाअगसः (*Yajurveda* IV, 12)

Water, that we have drunk, may become auspicious, make us free from all sin and malady and sickness.

(vii) *Rigveda* X, 9, 1 states: आपो हि ष्ठा मयोभुवस्ता न ऊर्जे दधातन । महे रणाय चक्षसे ॥

Ye, Waters are beneficient, so help ye us to energy. that we may look on great delight. (Griffith)

(viii) यो वः शिवतमो रसस्तस्य भाजयते ह्नः उशतीरिव मातरः

(*Rigveda* X, 9, 2)

Ye waters, give us a portion of the lap, the most

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auspicious, that ye have like mother in their longing love.

(ix) ईशाना वार्याणां क्षयन्तीश्चर्षणीनाम्
अपो याचामि भेषजम्।

(*Rigveda* X, 9, 5)

I beg of floods to give us balm, these queens who rule over precious things, and have supreme control over men.

In an address to waters it is prayed in *Yajurveda* VI, 31.

(x) मनो मे तर्पयत प्राणं मे तर्पयत चक्षूमे तर्पयत
श्रोत्रं मे तर्पयतात्मानं मे तर्पयत ॥

(*Yajurveda* VI, 31)

Content my mind, content my speech. Content my breath, content mine eye. Content my ear, content my soul etc.

(*Rigveda* VII, 104, 21)

(xi) *Atharva.* XIX, 2, 8 is full of references to the healing power of water.

शं त आपो हैमवतीः शमु ते सन्तूत्स्याः
शं ते सनिष्यदा आपः शमु ते सन्तु वर्ष्याः

(*Atharva.* XIX, 2, 1)

Blest be the streams from hills of snow, sweet be spring waters unto thee. Sweet be swift running waters, sweet to thee be water of the rains. (Griffith)

(xii) Rainy water, water from fountains, have electric power in them and they make the body elastic like that of a horse.

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अपामह् दिव्यानामपां स्रोतस्यानाम्
अपामह प्रणेजनेऽश्वा भवथ वाजिनः ॥

(*Atharva.* XIX, 2, 4)

(B) Different Kinds of Waters :-

The different kind's of water are enumerated in the *Atharvaveda,* as under

(i) देवीः आपः (I, 4, 3) water received from clouds.

(ii) वार्षिकीः आपः (I, 6, 4) Rainy water.

(iii) सिंधुः (I, 4, 3) Sea water.

(iv) अनूप्याः आपः (I, 6, 4) water obtained in watery regions

(v) धन्वन्याः आपः (I, 6, 4) Water obtained in desert or regions of scanty rains.

(vi) खनित्रिमाः आपः (I, 6, 4,) Water obtained from wells which are sunk.

Atharvaveda XIX, 2 also gives detailed classifications of waters

(vii) हैमवती — Water from mountains.

(viii) अत्स्याः — Fountain water.

(ix) सनिष्यदाः — Water of streams and canals which are flowing throughout the year.

(x) वर्ष्याः — Rainy water.

(xi) धन्वन्याः — Water in desert area

(xii) कुम्भेभिरामृताः — Water stored in pitchers.

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III. Homeopathy in the Vedas

Homeopathy is based on the "Law of Similars" and its medicines are potencized in 3, 6, 30, 200, 1000, etc.

While discussing the Doctrine of Signature, we have already referred to the Law of Similars in Nature, which forms the basis of Homeopathic treatment.

Atharvaveda IV, 17, 1 refers to the increasing of potency in medicines 1000 times.

ईशानां त्वा भेषजानामुज्जेष आ रभामहे
चक्रे सहस्रवीर्यां सर्वस्मा ओषधे त्वा ॥

(*Atharva.* IV, 17, 1)

"We seize and hold thee, conquering one, the queen of medicines that heals. Plant, I have endowed thee with a thousand powers for every man." (Griffith)

(a) Homeopathy and Allopathy :-

Homeopathy is based on Ha-hnemann's doctrine of "*Similia Simibilus Curentor*". When a drug is given to cure diseases which have symptoms similar to the physiological effects of that drug, it is said to be administered homeopathically. This procedure is contrary to the principle of allopathy in which there is no direct relation between the symptoms of the disease and the physiological effecets of drugs. For instance, it is well known that strong decoction of coffee at night causes sleeplessness. In homeopathy coffee is a drug given to cure insomnia and so on with Arsenic, Ipecac, Laches is, Apis etc. In allopathy

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fever is cured, say, by a purgative or diaphoretic mixture and thereby, the entire system is stimulated to increased activity in the hope of relieving the morbidity present in some particular part, even though the other parts, the kidney, bowels, skin etc. are functioning normally. The ultimate result is that such artificial stimulation instead of curing the disease, increases constipation or indigestion or morbid conditions and sometimes causes poisons.

Law of Similars is not a new law but was recognised long ago. Hippocrates, the father of modern medicine, wrote that, "Disease is produced by similars and by similars administered, the patient is restored to health, thus, that which produces strangury cures strangury and that which causes vomiting. cures vomiting."

'Likes ought to be removed by likes and not by contraries' is the basic axiom in Homeopathy.

(b) Potencies in Homeopathy.

There are three classifications of potencies in Homeopathy.

Lower Potencies 1x, 3x, 6x, 12x, 3, 6

Medium Potencies 12, 30.

Higher Potencies 200, 1000 (M), 10,000 (D. M.) 1,00,000 (C. M.), 1 million (M. M.)

Potencizing is a process of succession and attention by which a new power, usually styled nuclear energy is developed in them and thus they are

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capable of curing cases unaffected by lower potencies. Since we are concerned with the allusion of 1000th potency in the verse of the *Atharvaveda* IV, 17, 1, quoted above, we need not go into further details of the working of Homeopathy.

(c) The Three Soras :—

Homeopathy recognises three basic substances-Sulphur, Mercury and Salt-the three *Soras* which are the necessary ingredients of all bodies-organic or inorganic-they correspond to three Doshas of the Ayurveda or the "three humours" of the Greeks, which we have already alluded to before.

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IV Chromopathy in the Vedas

References to treatment of diseases of heart, kindney, liver etc., by means of Sun's rays are found in *Atharvaveda* I. 22 and in *Atharvaveda* VI, 83.

(a) In *Atharvaveda* IX, 8, it is mentioned that the rays of the sun absorb all poisons of the body and thus become effective in curing diseases.

शीर्षक्तिं शीर्षामयं कर्णशूलं विलोहितम्
सर्वं शीर्षण्यं ते रोग वहिर्निर्मन्त्रयामहे ।

(*Atharvaveda IX*, 8, 1)

i. e. Sunlight cures each pain and ache that rocks the head, earache and erysipelas and all malady that wrings the brow.

(b) *Sunlight kills germs.*

(i) उत् पुरस्तात्सूर्य एति विश्वदृष्टो अदृष्टहा

(*Rigveda* I, 191, 8)

Slayer of things unseen, the sun, beheld of all, rises.

(ii) उद्यन्नादित्यः क्रिमीन् हन्तु

(*Atharva*. II, 32, 1)

Uprising, let the Sun destroy the worms.

(iii) ये सूर्यं न तितिक्षन्त

(*Atharva*. VIII, 6, 12

These worms cannot bear the Sun.

(*Rig*. I, 50, 11)

(iv) हृद्रोगं मम सूर्य हरिमाणं च नाशय

Sunlight is efficacious in heart-diseases and jaundice.

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(c) *Colour-Therapy*

Colour-therapy has recently made a very great progress in modern medicine. It is now well-recognized that all colours which emanate from the sun, affect not only the physical health of a person but also his mental moods and feelings. The mental experts know how colours can help to calm down the disturbed mental conditions and this factor is made use of in industries too, to ensure a happier and healthier condition of living for the workers.

Solar spectrum contains seven primary colours viz., (1) Violet, (2) Indigo, (3) Blue, (4) Yellow, (5) Green, (6) Orange, (7) Red, called by the symbol *Vibygor*, although in these seven colours there are as many us 378 visible colour combinations. Wrong colour combinations will cause depression, but right selection produces exhiliration. It is rightly said, "If you are a "bundle of nerves, cannot relax, feel depressed, why not try a dose of colour?"

Red and orange are warm, green is relaxing and blue colour is the best for quietening the nerves. In broadcasting houses, for example, in the radio studios of the National Broadcasting Company of America, one can find the walls and ceilings painted in two shades of blue and this has been found invigorating and an antidote against any *stage fright* for those waiting to broadcast.

The restful harmony which the sun's rays produce through the combination of colours was recognized by

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the vedic seers and the *Atharvaveda* presents in a nucleus form, this aspect of chromopathy, as indicated in the above quoted mantras.

V Fever-Therapy in the Vedas.

Atharvaveda V, 22, deals with fevers.

(a) There are three types mentioned,

(i) सदहिन: which occurs daily.

(ii) तृतीयक: which occurs every third day.

(iii) वितृतीयक: which occurs on the fourth day, i.e. after three days are gone.

तृतीयकं वितृतीयं सदन्दिमुत शारदम्
तक्मानं शीतं रूरं ग्रैष्मं नाशय वार्षिकम् ॥

(*Atharva. V*, 22, 13)

(b) Apart from these three types of periodical agues, there are seasonal fevers.

(i) ग्रैष्म: Fever occuring in summer season on account of excess of heat.

(ii) शारद: Fever occuring in winter monsoons.

(iii) वार्षिक: Fever occuring in rainy season.

(iv) शीत: Malarial fever which occurs as a result of shiver.

(v) रूर: Fever occuring on account of dryness.

(vi) वलास: Fever on account of phlegm.

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(vii) कासः Fever which is accompanied by bronchites.

(viii) उत-युगं Phlegm and bronchitis both occur in this type.

(ix) व्यालः High fever, as severe as a snake bite.

(c) In *Atharvaveda* V, 22, verses 6,7,12 we have a mention of the classes of people who suffer from attacks of fever.

(i) निष्टक्करीं The thin and lean and one leading dirty life.

दासीं निष्टक्करीमिच्छ तां वज्रेण समर्पय (V, 22, 6)

(ii) प्रफर्व्यम् One who is fat

शूद्रामिच्छ प्रफर्व्यं तां तक्मन् वीव धूनुहि
(V, 22, 7)

(iii) अरणं जनम् one leading flagrant life

पाप्मा भ्रातृव्येण सह गच्छामुमरणं जनम् ॥
(V, 22, 12)

(d) *Atharvaveda* V, 22, 9, holds that fever does not attack a person who is self controlled.'

अन्यक्षेत्रे न रमसे वशीसन् मृडयासि नः ।

"One who is self controlled among us, fever does not give him pain but keeps him unaffected."

(e) Then in *Atharva.* V, 22, 2, V; 22, 4, remedies against fever are suggested. The following types will not normally get fever.

(i) The one who performs sacrifices. By havan, yajna, the air is purified and there

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is no contamination of atmosphere by germs.

बर्हिः शोशुचाना समिधः
इतः तक्मानं अप बाधताम् ॥

(*Atharva*. V, 22, 1)

(ii) The man who takes care of his bowels because; according to vedic injunction, there should be no constipation and there will be no fever.

अधा हि तक्मन्नरसो हि भूया
अधा न्यङ्ङ धराङ् वा परेहि ॥

(V, 22, 2)

Disease starts from below.

(iii) Thirdly, one must be a vegetarian and should eat with reservation.

शकम्भरस्य मुष्टिहा पुनरेतु महावृषान्

(*Atharva*. V, 22, 4)

the metaphor is, that the vegetarian will strike the fever away, as if by a fist.

(मुष्टि-हा)

(f) The vedic word for ague is तक्मा derived from तकि कृच्छ्रे जीवने, inflcting pain on the body. We have a reference to this in *Atharva*. I,25,1

यदग्निरापो अदहत् प्रविश्य
यत्रा कृण्वन् धर्मधृतो नमांसि ।
तत्र त आहुः परमं जनित्रं स नः
संविद्वान् परि वृङ्ग्धि तक्मन् ॥

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"When Agni blazed, when he has pierced the waters" (the idea is that fevers begin to be prevalent at the commencement of the annual rains, when Agni, the God of Fire descends in the form of lightening from the waters of the firmament and falls with the rain into the waters of the earth.)

(Griffith. *Atharvaveda*-p. 30)

According to their types and the seasons, there are more than forty names given to fevers, The long list is outside the scope of this small treatise,

(g) The Three Herbs :

There are several remedies suggested in the *Atharvaveda* to counteract agues but the three are most popular herbs. They are जंगिड:

(i) *cf.* आशरीकं विशरीकं बलासं पृष्टयामयम्
तक्मानं विश्वशारदमरसां जंगिडस्करत् ।।

(*Atharva*. XIX, 34, 10)

"Lumbago and rheumatic pain, consumptive cough, and pleurisy and fever which each autumn brings, may *jangida* make powerless". (Griffith)

(ii) कुष्ट *Kushta* is another remedy given in *Atharva* V, 4, I

कुष्टेहि तक्मनाशन तकमानं नाशयन्नित: ।।

(iii) The third is आँजन

त्रयोदासा आँजनस्य तक्मा बलास आदहि ।।

(*Atharva*. IV, 9,8)

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The three troubles viz. fever, phlegm, and burn are controlled effectively by the herb known as *Anjana*--

(h) **Prayer for Healing of a Sick Person**

Atharvaveda X, 6, 8

holds : यमबध्नाद् बृहस्पतिर्मणिफालं

घृतशच्युतमुग्रं स्वदिरमोजसे

तेनोमाँ मणिना कृषिमश्विनावभिरक्षतः संभिषग्भयां महोदुहे ॥

"The charm Brihaspati hath bound...the Asvins with the Amulet protect this culture of our fields. This may yield power and protection by two physicians."

(6) **The Chemistry of Metals.**

(a) In Vedic times. gold, silver. copper. iron, lead etc. were and used as medicines and we have a reference to this fact in *Yajurveda*, XVIII, 13.

हिरण्यं च मेऽयश्च मे श्यामं च मे लोहं च मे

सीसं च मे त्रपु च मे यज्ञेन कल्पन्ताम् ॥

'May my gold and my bronze and my copper and my iron and my lead and my tin, prosper by sacrifice.'

(b) Lead is frequently mentioned as a general tonic

सीसेन दुह इन्द्रियम् (*Yajurveda* XXI, 36)

'with lead, yield strength and power !

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इदं बाधत्तअत्त्रिण

जातानि पिशाच्या:

(*Atharva*. 1, 16,3)

It kills the germs known as Atri. Pishacha, Yatu, Rakshasa etc.

(iii) Mark the emphasis of its efficacy in *Atharva*. 1, 16,4.

यदि नोगाँ हंसि यद्यश्वं यदि पूरुषं

तं त्वा सीसेन विध्याम: ।।

'If you destroy a cow of ours, a human being or a stead, we pierce thee with this piece of lead, so that thou mayest not slay our men.' Again,

योगोषुयक्षम: पुरुषेपु यक्षम: तेन त्व साकमघराङ् परेहि

(*Atharva*. XII, 2, 1).

'Lead is a remedy against consumption in the cattle, consumption in men.'

(7) **Treatment in Snake Bites.**

(a) *Hypnotic Method*.

(i) There is a mention of treatment by Hypnotic method called संवशीकरण In *Atharva*. V, 13, we have :

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चक्षुषाते चक्षुर्हन्मि विषेण हन्मि ते विषम्

अहे म्रियस्व मा जीवीः प्रत्यगम्थेतु त्वा विषम् ॥

(*Atharva*. V, 13, 4).

"I with this eye destroy thine eye, and with this position conquer thee. Live not, O Snake, but die the death, back go thy venom on thyself." (Griffith)

(ii) *Atharva*. VII. 93, reads: इन्द्रेण मन्युना वयमभिस्याम

पृतन्यतः घनन्तो वृत्राण्यप्रति ॥

"With Indra's and with Manyu's aid, may we subdue our enemies resistlessly destroying foes. (Griffith)

(iii) *Atharva*, VII, 56, 2, refers to the same :

इयं वीरुन्मधुजाता मधुश्चुन्मधुलामधू :

सा विद्रुतस्य भेषज्यथो मशकजम्भनी ॥

'Honey-born, honey-dropping, rich in honey honey-sweet, this herb is medicine that heals the wound and kills the gnat that bites and stings'. (Griffith).

(iv) *Atharva*. V,13,5, is just a hypnotic way of asking the snakes of the class *kairat* कैरात, पृश्न, उपतृण्य, बभ्रु and असित and अलीक, not to stay in the courtyard.

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कैरात पृश्न उपतृण्य बभ्र आमे
शृगुतासिता अलीकाः
मा मे सख्युःस्ताभानमपिष्ठाता
श्रावयन्तो निविषेरमध्वम् ॥

"Listen to me, Black-snakes, and hateful creatures, Lurker-in-grass, Kairat, and Brown and Spotted Approach not near the house, my friend inhabits, give warning and rest quiet with your poison." (Griffith).

(v) *Atharvaveda* V, 13 refers to eighteen varieties of snakes as under :

कैरातः	living in forests
पृष्निः	spotted
बभ्रुः	of brown colour
असितः	of black colour
अलीकः	bad to look at
तैमातः	living in wet places
अपोदक	not living near water
सात्रासाहः	attacking any wav-farer
मन्युः	extremely wrathful
उपतृण्यः	living in grass
आलिगी	coiling round the body
विलिगी	remaining away from the body
उरुगुला	having large body

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असिक्नी	black female serpant
दद्रुषी	causing itch after bite
कर्णा	having ears
श्वावित्	one whom the dog follows
खनित्रमा	snake emerging out from underground.

The medicinal herbs suggested as cure are ताबुव and तस्तुव. What is the exact medicine named for these is yet a matter for research. It is conjectured that these may be some kind of stones, rubbing of which cures snake bite. The second method is to tie very closely, the part stung from three places-highest, middle, lowest, as a cure against snake bite.

गृह्णामि ते मध्यमम उत्तमम्
अवमन् एतासु विषं अग्रमम् ॥

(*Atharva*. V, 13, 2)

And if by any hypnotic process, the serpent or scorpion does not get away of its on accord, then it should be killed by a rod or a strong hammer.

घनेन हन्मि वृश्चिकमहिं दण्डेनागतम् ॥

(*Atharva*. X, 4,9)

"I kill the scorpion with a club, and with a staff, the new-come snake." (Griffith)

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(8) Gem Therapy in the Vedas.

The Ayurvedic practitioners have a higb praise for use of gems in warding off diseases. For example, in *Susharuta* chapter 46, we have

मुक्ताविद्रुमवजरेन्द वैदूर्यं स्फटिकादय :
चक्षुण्या मणयः शर्ता लेखना विषेसूदना :
पवित्रा धरणीयाश्च पाप्मालक्ष्मी मलापहाः ॥

The gems are मोती, मूंगा. हीरा,लहसुनिया, स्फटिक etc.

Wearing of these gems improves eyesight, has cooling effect, purifies the mind, increases beauty. decreases ugliness and removes poison. Inspite of the fact that wearing of these gems is advocated in Ayurveda as curative for ailments yet, it is believed by scholars that references to मणिबन्धन (a list of which is given below) in the *Atharvaveda* has no bearing on these gems. but relate to knowledge of agricultural missiles and other scientific equipments. For example, it is believed that फालमणिवन्धन in *Atharva. veda* X, 6, has nothing to do with a particular type of gem known as फालमणि but has relation to agricultural implements and the same view is held about the references of

आञ्जनमणिः	in *Atharvaveda* IV, 9
शंखमणिः	in *Atharvaveda* IV, 10
अस्तृतमणिः	in *Atharvaveda* 1, 46
जंग्डिमणिः	in *Atharvaveda* 11, 4
do	in *Atharvaveda* XIX 34,

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पर्णमणिः	in *Atharvaveda* III,5
शतवारमणिः	in *Atharvaveda* XIX. 36
ओदुग्धमणिः	in *Atharvaveda* XIX, 31
अभिवर्तमणिः	in *Atharvaveda* 1, 29
प्रतिसरमणिः	in *Atharvaveda* VIII,5
दर्भमणिः	in *Atharvaveda* XIX,28/29/30
औदुम्बरमणिः	in *Atharvaveda* XIX, 31
वरणमणिः	in *Atharvaveda* X, 3
फालमणिः	in *Atharvaveda* X, 6

It is a matter for further research to arrive at the exact type of scientific equipments covered by these terms.

Gems and Astrology.

About the effectiveness of gems, if at all, we take them as popularly understood, Dr. Benoytosh Bhattacharya writes, "The seven principal gems are the inexhaustible mines of the seven cosmic rays constituting the Cosmos or the universe...Like the planets. these sacred gems are nothing else but condensations of the seven cosmic rays." (*Gem Therapy, p.7*). Gems are being used by men from time immemorial. Mostly gems are used for increasing wealth and longevity, for power and popularity, and for averting diseases and misfortunes. Kings in ancient India were advised to collect the very best gems to protect themselves against emergencies. In Astrology, people struck with

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misfortune are advised to wear different kinds of gems in order to counteract the effect of malefic planets."

(*Ibid*. p. 2)

These मणि: 's, circular gems, with a hole, were taken from dried roots of herbs and used as medicines in the vedic times. Whether they were actually tied round the waist or the arms, as is a custom prevalent even now a days, is not clear. Some scholars, however infer from a word ग्रसते in *Atharvaveda* XIX, 34, 8, that these gems were tied on the ,parts of the body.

अथोपदान भगवोजगिडामितवीर्य
पुरात उग्रा ग्रसत उपेन्द्रो वीर्यं ददौ ॥

(*Atharva*. XIX, 34, 8)

Griffith translates this verse, thus :
"Then when thou sprangest into life,
Jangida of unmeasured strength,
Indra, O mighty one, bestowed,
Great power upon thee from the first".

(*The Atharvaveda* p. 293)

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(9) Veterinary Science in the Vedas.

Veterinary science which has for its nucleus the *Atharvaveda* VI, 59; 11, 26; 1,11,14; etc. had immense expansion with the postvedic teachers, and we have voluminous treatises, not only on Botany and vegetable kingdom (वृक्षायुर्वेद) but on horses (अश्वायुर्वेद) elephants (हस्त्यायुर्वेद) the cows (गवायुर्वेद) and even on hawks. (श्येनकायुर्वेद)

Charaka devotes chapter II verses 19 to 26 to this science and *Harit Samhita* has several references to this. Salihotra is known as the father of the veterinary science and in the Punjabi dialect, the word 'Salotri' is known as a veterinary surgeon.

Hindu Veterinary science possesses a monumental compilation known as "*Hasti-Ayurveda*", the sacred wisdom on the "Longevity of Elephants." This text has been edited by Mahadeva Apte and is a huge work consisting of 46 chapters and about seven thousand and seven hundred stanzas.

The *Matanga-Lilla* of Nilakantha and Franklin Edgertons' book '*The Elephant-Lore of the Hindus*', are remarkable contributions on elephant Surgery and therapy and can be studied with advantage by the inquisitive reader.

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(10) **Dairy-Farming.**

We have references to this in *Atharva*. 11, 26. It is essential for the cows to roam about, to ensure healthy breeding. (cf. येषां सहचारं वायुः जुजोष *Atharvaveda* II, 26, 1) and those animals which have gone out may return safely is indicated in :
Atharvaveda 11, 27, 1.

ये पशवः परा ईयुः ते इह आयन्तु

Atharvaveda III, 14 is an important hymn on cow-breeding (गोसंवर्धन)

The most efficacious remedy in veterniary diseases is the herb known as अरुन्धती

(Atharva VI, 59)

It increases milk in the animals like cow.

अनडूद्भ्यस्त्वं प्रथमं धेनुभ्यस्त्वमरुन्धति
अधेनवे वयसे शर्म यच्छ चतुष्पदे ।।

(*Atharva*. VI, 59, 1)

First, O Arundhati, protect our oxen and our milky kine-Protect each one that is infirm-each quadruped that yields no milk. (Griffith)

The following mantras on Cow-Breeding are interesting.

संजग्माना अबिभ्युषिरस्मिन्
गोष्ठे करीषिणाः
बिभ्रतीः सौम्यं मध्वनमीवा उपेतन ।।

(*Atharva* III, 14, 3)

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इहैव गाव एत नेहो शाकेव पुष्यत
इहैवोत अजायध्वं मयि संज्ञानमस्त वः ॥

(*Atharva*. III; 14, 4)

(iii) शिवो वो गोष्ठो भवतु
शारिशाकेव पुष्यत इहैवोत प्र
जायध्वं मयावः सं सृजामसि ॥

(*Atharva*. III, 14, 5)

मया गावो गोपतिना सचध्वमयं
वोपो गोष्ठइह पोषयिष्णुः ।
रायस्पोषेण बहुलाभवन्तीः
जीवाजींकन्तीरुपवः सदेम ॥

(*Atharva*. III, 14, 6)

(i)

Moving together, free from fear, with
Plenteous droppings in this pen,
Bearing sweet milk like Soma juice,
Come hither free from all disease.

(ii)

Come hither, to this place, O Cows, here
Thrive as though ye were manured
Even here increase and multiply, let us
Be friendly, you and me.

(iii)

Auspicious be this stall to you,
Prosper like cultivated rice.

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Even here increase and multiply,
Thyself do we bestow on you.

(iv)

Follow me, cows, as master of the cattle,
Here may this cow-pen make you grow and prosper,
Still while we live, may we approach you living,
Ever increasing with the growth of riches.

(Griffith's Translation)

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(11) On Disinfectants

सर्वेषां च क्रिमीणां सर्वासां च क्रिमणीम्
भिनद्याश्मना शिरो दहाम्यग्निना मुखम् ॥

Atharvaveda V, 23, 13

Of every worm and insect, of the female and the male alike—I crush the head to pieces with a stone and burn the face with fire.

आमे सुपक्वे शबले विपक्वे
यो मा पिशाचो अशने ददम्भ ।
तदात्मना प्रजया पिशाचा
वि यातयन्तामगदोऽयमस्तु ॥

(*Atharvaveda* V. 29, 6)

If some Pishacha, in my food, raw, ready, thoroughly cooked, hath deceived me-let the Pishachas with their lives and off-spring atone for this and let this man be healthy. (Griffith)

Surely these *Pishachas* in the food could not be demons or ghosts, but germs which cause contamination of the food.

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(12) Hair Diseases

Falling of hair etc. and premature grey hair. This subject is treated in *Atharva.* V1, 136. The remedy is the use of the herbs called,

केश दृंहणी (*Atharva.* VI, 21, 3)
नितत्नि (*Atharva.* VI,136, 1)
केशवर्धनी (*Atharva.* VI. 137, 1)
देदी देवयामधिजाता पृथिव्यामस्योषधे

(*Atharvaveda* VI, 136)

तां त्वा नितत्नि केशेभ्यो दृंहणाय खनामसि
दृंह प्रत्नान् जनयाजातां जातानु वर्षीय संस्कृधि
यस्ते केशो ऽवपद्यते समूलो यश्च वृश्चते
इदं तं विश्वभेषज्याभिषिञ्चामि वीरुधा ।।

(*Atharva.* VI. 136, 3)

Born from the bosom of wide Earth, the goddess, godlike plant art thou : So we Nitatni, dig thee up to strengthen and fix fast the hair.

Make the old hair firm, make new hair spring, lengthen what has already grown.

Thy hair where it is falling off and with the roots is torn away. I wet and sprinkle with the Plant the remedy for all disease. (Griffith's translation)

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(13) **Stupor.**

या ओषधयः सौमराज्ञीः वहवीः शत विचक्षणाः
बृहस्पति प्रसूतास्ता नो मुञ्चन्त्वहंसः ॥

(*Atharva*. VI, 96, 1)

The many plants of hundred shapes and forms that Soma rules as King commanded by Brihaspati, deliver us from grief and woe! (Griffith)

(14) **Insanity.**

देवैनसादुन्मदितमुन्मत्तं रक्षसस्परि
कृणोमि विद्वान् भेषजं यदानुन्मदितौसति

(*Atharva*. VI. 111, 3)

Insane through sin against the gods, or maddened by a demon's power-well-skilled I make a medicine, to free thee from insanity. (Griffith)

(15) **Eye-Diseases**

तिस्रो दिवस्तिस्रः पृथिवीः
षट् चेमाः प्रदिशः पृथक्
त्वयाहं सर्वा भूतानि
पश्यामि देव्योषधे ॥

(*Atharva*. IV, 20, 2)

Through thee, O god-like plant, may I *behold* all creatures that exist, three several earths and three these six regions one by one. (Griffith)

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(16) Heart-Diseases

यदासुतेः क्रियमाणायाः क्षेत्रियं त्वा व्यानशे
वेदाहं तस्य भेषजं क्षेत्रियं नाशयामि त्वत् ॥

(*Atharva*. 111, 7, 6)

'Hath some prepared decoction brought inveterate disease on thee. I know the balm that healeth it, we drive the malady away'. (Griffith)

(17) Piles

अरायमसृक्पावानं यश्च स्फातिं जिहीर्षति
गर्भादं कण्वं नाशय पृश्निपर्णि सहस्व च ।

(*Atharva*. 11, 25, 3)

The hateful fiend who drinks the blood and him who takes away the growth—The Kanva who devours the germs quell, Prisniparni ! and destroy. (Griffith)

(18) Bad Dreams

अरिप्रा आपो अपरिप्रमस्मन्
प्रास्मदेनो दुरितं सुप्रतीकाः
प्र दुष्वप्न्यं प्र मलं वहन्तु ॥

(*Atharva*. X, 5,24)

'May the pure waters cleanse us from defilement, Fair to behold, remove our sin and trouble and bear away ill dream and all pollution, (Griffith)

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(19) **Herb for Beauty.**

इदं खनामि भेषजं माँ पश्यमभिरोरुदम्

परायतो निवर्तनमायतः प्रतिनन्दनम् ।।

(*Atharva* VII, 38,1)

I dig this healing herb that makes my lover look on me and weep. That bids the parting friend return and kindly greets him as he comes. (Griffith)

(20) **Sterility**

आ ते योनिगर्भ एतु पुमान् बाण इवेषुधिम्

आ वीरो ऽत्र जायतां पुत्रस्ते दशमास्यः ।।

(*Atharva*. III, 23, 2)

यासाँ द्यौः पिता पृथिवी माता समुद्रो

मूलं वीरुधाँ बभूव

तास्त्वा पुत्रविद्याय दैवी प्रावन्त्वोषधयः ।।

(*Atharva*. III. 23, 6)

(ii) As arrow to the quiver, so let a male embryo enter thee. Then from thy side, be born a babe a ten month child, thy hero son. (Griffith)

(iii) May those celestial herbs whose sire was Heaven, the earth their mother and their root the ocean. May those celestial plants assist thee to obtain a son. (Griffith)

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(21) **Herb for Pregnancy**

शमीमश्वत्थ आरुढ़ तत्र पुंसुवनं कृतम्
तद् वै पुत्रस्य वेदनं तत्स्त्रीष्वा भरामसि ॥

(*Atharva*. VI, 11. 1)

'Asvattha on the Shami-tree. There a male birth is certified. There is the finding of a son; this bring we to the women-folk.' (Griffith)

22) **Female Diseases**

यस्ते गर्भममीवा दुर्णामा योनिमाशये
अग्निष्ठं ब्रह्मणासह निष्क्रव्याद मनीनशत् ॥

(*Atharva*. XX, 96, 12)

Agni, concurring in the prayer, drive off the eater of thy flesh. The malady of evil-name (दुर्णामा) that hath attacked thy babe and womb. (Griffith)

(23) **Contagious Diseases and Atharvaveda** VII. 65, 3

श्यावदता कुनखिना बण्डेन यत् सहासिम
1 2 3 4
अपामार्ग त्वया वयं सर्वं तदपमृज्महे ।

If with the cripple we have lived, whose teeth are black and whose nails deformed with thee, O Apamarga the plant *achyranthes aspera* we wipe all that ill away, from us. (Griffith)

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(24) **Leprosy**

नक्तं जातास्योषधे रामे कृष्णे असिक्निच
इदं रजनि रजय किलासं पलितं च यत् ।

(*Atharva*. I, 23, 1)

Plant, thou sprangest up at night, dusky, dark coloured black in hue! So Rajni, re-colour thou these ashy spots of this leprosy. (Griffith)

(25) **Haemorrage**

(*Atharva*. II, 3) This is checked by लाक्षा herb

अरुः स्राणमिदं महत् पृथिव्या अध्युद्भृतम्
तदास्रावस्य भेषजं तदु रोगमनीनशत् ॥

(*Atharva*. II, 3,5)

Mighty is this wound-healing balm from out the earth was it produced. Thls is the cure for morbid flow this driveth malady away. (Griffith)

(26) **Skin Diseases**

विद्रधस्य बलासस्य लोहितस्य बनस्पते
विस्लपकस्योषधे मोच्छिषः पिशितं च न ॥

(*Atharva*. VI. 127,1)

Of abscess, of decline, of inflammation of the eyes, O plant of penetrating pain! thou herb, let not a particle remain. (Griffith)

(27) **Sciatica Pain** सन्धिवात

दश वृक्ष मुञ्चेमं रक्षसो ग्राह्या ।
अधि यैनं ज ग्राह पर्वसु
अथो एनं वनस्पते जीवानां लोकमुन्नय ॥

(*Atharva*. II, 9, 1)

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Free this man Disa vriksha ! from the demon, from *grahi* who hath seized his joints and members.

And raise him up again, O Tree, into the world of living men. (Griffith)

(28) **Birth Control or** Family Planning

Atharvaveda VI. 138 refers to birth control by rendering one impotent. The name of the herb is not mentioned, but the entire hymn with five verses is worth examination.

त्वं वीरूधां श्रेष्ठतमाभिश्रुतास्योषधे
इमं मे अद्य पूरुषं क्लीबमोपशिनं कृधि ॥

(*Atharva*. VI, 138, 1)

Plant, thy fame is spread abroad as best of all the herbs that grow. Unman for me to-day, this man that he may weat the horn of hair-Make him a eunuch.

क्लीवं क्लीवं त्वाकर्र वध्रेबध्रि
त्वाकरमरसारसं त्वाकरम् ।
कुरीरमस्य शीर्षणि
कुम्बं चाधिनिदध्मसि ॥

(*Atharva* VI, 138,3)

Yes, I have unmanned thee eunuch ! yes, impotent ! made thee impotent, and robbed thee weakling of thy strength. (Griffith)

Incidentally it may be mentioned that perhaps for reason of obscenity, Griffith has not translated the

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verses 4 and 5.

Atharvaveda VI, 138. 4, perhaps refers to that operation by means of which the right testicle (seminal) gland is cut.

ये ते नाड्यौ देव कृते ययोस्तिष्ठति वृष्यम्
ते ते भिनद्मि शम्ययामुष्या अधि मुष्कयोः ॥

(*Atharva.* VI, 138, 4),

(29) **Wooing a Woman**

According to Macdonell, "there is a group of charms concerned with women being intended to secure their love with the aid of various herbs, potent herbs." (*Sanskrit Literature*)

यथेमे द्यावापृथिवी
सद्यः पर्येति सूर्यः
एवा पर्येमि ते मनो
यथा मां कामिन्यद सो
यथा मन्नापगा असः ॥

(*Atharva.* VI. 8 3)

As round this heaven and earth, the sun goes day by day encircling them. So do I go around thy mind that, woman, thou shalt love me well and shalt not turn away from me.' (Macdonell's translation)
Atharva. III, 25, 2, is another instance.

आधीपर्णां कामशल्यामिषुं
सङ्कल्प कुल्मलाम् ।
तां सुसन्नतां कृत्वा कामो
विध्यतु त्वा हृदि ॥

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That arrow, winged with loving thought, its stern desire, its meek resolve. Let Kama, having truly aimed shoot forth and pierce thee in the heart. (Griffith)

(30) **Scrofula** (गण्ड माला)

This is known as अपचित् and is of eight kinds. It affects the neck. In *Atharva*. VII.76, it is called ग्रैव्य

य ग्रैव्या अपचितोथो या उपपक्ष्याः
विजाम्नि या अपचितः स्वयं स्रसः ।

(*Atharva*. VII. 76, 2)

Pustules that rise upon the neck. Pustules upon the shoulder joints, Pustules, that falling of themselves, spring upon every two fold limb. (Griffith)

For its remedy, the *Atharvaveda* VI, 83, advocates treatment by rays of the sun and the moon and *Atharvaveda* VII, 74, 1, suggests surgical operation with instrument made with the root of a herb known as मुनिवृक्ष

Reference to surgical operations by Asvini Kumaras, the physicians of the gods is found in the *Rigveda*. That is known as शल्यक्रिया.

(31) **Tuberculosis**

It is known as जायान्यः (*Atharva*. VII, 76, 5), because it is caused by excessive sexual intercourse and consequent loss of vitality-a disease caused through the female sex. यज्जायाभ्योऽविन्दत् तज्जायेन्यस्य।

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This is what *Taittiriya Samhita* II, 3, 5. 2 states. also called पाप्मा (*Atharva*. V. 22, 12). Its remedy lies in the use of herb known as अंजन (*Atharva*. XIX. 44, 2) and sacrificial homa which will kill germs. *Atharva*. VII, 76. 5 states the use of sacrificial homa as a remedy.

विद्म वै ते जायान्य जानं
यती जायान्य जायसे
कथं ह तत्र त्वं हनो
यस्य कृण्मो हविर्गृहे ॥

We know thy origin, know whence thou art born. How hast thou then struck this man here. him *in whose house* we *sacrifice*. (Griffith)

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यती जायान्य जायसे
कथं ह तत्र त्वं हनो
यस्य कृण्मो हविर्गृहे ॥

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APPENDIX A

Selection of certain medicines mentioned in the *Atharvaveda*.

दशवृक्ष	*Atharva* 1I; 9	wind troubles
प्राशं	*Atharva*. II, 27	general debility
पिप्पली	*Atharva*. VI. 109	fevers
पृश्निपर्णी	*Atharva*. fI, 25	killing vaginal germs
रोहिणी	*Atharva*. IV, 12	fracture of bones
लाक्षा	*Atharva*. V, 5	skin trouble-anti-septic
सहस्रचक्षुः	*Atharva*. IV, 20	general tonic curing 1000 diseases as it were—specifiic for eyes.
तौरिलिका	*Atharva*. IV. 16	ear diseases
सहस्रपर्णी	*Atharva*. VI.139	a herb of a 1000 leaves, a general tonic.

सोमलता. This is a unique herb mentioned in the vedas. The entire book IX of the Rigveda with all its 114 hymns, contains an admiration of the herb. It is a nectar guaranteeing Immortality. It is a panacea for all ills. From various clues in the Rigveda we can have an idea of what kind of herb tnis is : For instance शृंगे शिशानो अर्षति । *Rig*. IX, 5, 2

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It is produced on hill top.

सोममद्रौ (*Rig.* V. 85, 2)—Soma is born on the mountains.

सोमस्येव मौजवतस्य भक्षः (*Rigveda* X, 34.14) It has many branches, but downwards—a tall plant.

अन्तरिक्षेण रारजत् (*Rigveda* IX, 5, 2)—a very tall plant going up the skies.

सहस्रवल्शं (*Rigveda* IX, 5,10)—of many branches and then there are several verses indicating how to use it either alone (अत्ययेवारे)

or with curd सामासो दध्याशिरः (*Rig.* I, 5, 5), *Rig.* IX. 103, 3)

or with cow milk सोमगवाशिरः (*Rig.* I, 137, 1)

or with barley. यवाशिरो भजामहे । (*Rig* 1. 187. 9).

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APPENDIX (B)

Ancient India's Contribution, in the field of Physiology and Medicine

"The Vedas show a very primitive stage of medical and physiological lore, but the basic textbooks of Indian medicine, the compendia of Caraka (1st-2nd centuries A.D.) and Susruta (c. 4th century A.D.) are the products of fully evolved system which resembles those of Hippocrates and Galen in some respects, and in others has developed beyond them. We have no medical texts of the intervening period, but there is little doubt that two factors encouraged medical knowledge, the growth of interest in physiology through the phenomena of yoga and mystical experience, and Buddhism. Like the Christian missionary of later times, the Buddhist monk often served as a doctor among the layfolk from whom he begged his foods, moreover he was encouraged to care for his own health and that of his fellow monks, and his creed tended towards rationalism and a distrust of the medical magic of earlier times. The development of medicine was also probably stimulated by contact with Hellenic physicians, and the resemblances between Indian and classical medicine suggest borrowing

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on both sides. After Susruta, Indian medicine developed little, except in the growing use of mercurial drugs, and of others, such as opium and sarsaparilla, which were introduced by the Arabs. In its essentials, the system practised by the ayurvedic physician of present day India remains the same.

The basic conception of Indian medicine, like that of ancient and medieval Europe, was the humours (dosa), Most authorities taught that health was maintained through the even balance of the three vital fluids of the body viz., wind, gall and mucus, to which some added blood as a fourth humour. The three primary humours were connected with the scheme of the three gunas, or universal qualities and associated with virtue, passion and dullness, respectively.

The bodily functions were maintained by the five "winds" (vayu) : udana, emanating from the throat, and causing speech ; prana, in the heart, and responsible for breathing and the swallowing of food ; saman, fanning the fire in the stomach "cooked" or digested the food, and dividing it into its digestible parts ; apana in the abdomen, and responsible for excretion and procreation ; and vyana, a generally diffused wind, causing the motion of the blood and of the body generally. [The food digested by the samana became chyle, which proceeded to the heart, and thence to liver, where its essence was converted

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into blood. The blood in turn was in part converted into flesh and the process was continued through the series, fat, bone, marrow and semen ; the latter, when not expelled, produced energy (ojas),which returned to the heart and was thence diffused over the body. This process of metabolism was believed to take place in thirty days.

Ancient Indian doctors had no clear knowledge of the function of the brain, and believed with most ancient peoples that the heart was the seat of intelligence. They realized, however, the importance of the spinal cord and knew of the existence of the nervous system, though it was not properly understood. The progress of physiology and biology was impeded by taboo on contact with dead bodies which much discouraged dissection and the study of anatomy, although such practices were not completely unknown.

Despite their inaccurate knowledge of physiology; which was by no means inferior to that of most ancient peoples, India evolved and developed empirical surgery. The caesarion section was known, bone-setting reached a high degree of skill, and plastic surgery was developed far beyond anything known elsewhere at the time. Ancient Indian surgeons were expert at the repair of noses, ears and lips, lost or injured in battle or by judicial mutilation. In this respect Indian surgery remained ahead of European

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until the 18th century, when the surgeons of the East India Company were not ashamed to learn the art of rhinoplasty from the Indians.

Though Indians very early conceived of the existence of microscopic forms of life, it was never realized that these might cause diseases; but if Indian surgeons had no true idea of antisepsis or asepsis, they encouraged scrupulous cleanliness as they understood it, and recognized the therapeutic value of fresh air and light. The pharmacopia of ancient India was very large, and comprised animal, vegetable and mineral products. Many Asiatic drugs were known and used long before the introduction into Europe, notably the oil of the *chaulmurga* tree; traditionally prescribed as a specific for leprosy, and still the basis of the modern treatment of the disease.

The physician was a highly respected member of society, and the *vaidyas* rank high in the caste hierachy to this day. The rules of professional behaviour laid down in medical texts remind us of those of Hippocrates and are not unworthy of the conscientious doctor of any place or time. We quote part of the sermon which Caraka instructs a physician to preach to his pupils at a solemn religious ceremony to be performed on the completion of their apprenticeship:

"If you want success in your practice, wealth and fame, and heaven after your death, you must pray

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every day on rising and going to bed for the welfare of all beings, especially of cows and brahmans, and you must strive with all your soul for the health of the sick. You must not betray your patients, even at the cost of your own life, you must not get drunk or commit evil or have evil companion..... ..... You must be pleasant of speech ..... and thoughtful, always striving to improve your knowledge.

"When you go to the home of a patient, you should direct your words, mind, intellect and senses nowhere but to your patient and his treatment.....Nothing that happens in the house of the sick man must be told outside, nor must the patient's condition be told to anyone who might do harm by that knowledge to the patient or to another."

Under the patronage of the more benevolent kings and religious foundations, free medical aid was given to the poor. Asoka took pride in the fact that he had provided medicines for man and beast, and the traveller Fahien, in the early 5th century A.D., made special note of the free hospitals maintained by the donations of pious citizens. Unfortunately, we have no detailed descriptions of such establishments.

Veterinary medicine was also practised. The doctrine of non-violence encouraged the endowment of animal refuges and homes for sick and aged animals, and such charities are still maintained in many cities

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of India. The horse and elephant doctors were members of skilled and respected professions, much in demand at court. and texts on veterinary science survive from the Middle Ages".

(A.L. BASHAM, *The Wonder that was India*, p 499 ff.)

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Book IV

The Science of Cosmology

(or The Concept of God in the Vedas)

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CHAPTER I

THE DEFINITION OF GOD IN VEDIC PARLANCE

The great Spirit that rules over the colourless and impalpable cosmos provides a baffling problem both to the philosopher and the scientist.

In a life full of stress and strain, of disease and death, shall we ever think of God and His solicitude for man ? In the whirlwind of wars and national calamities, shall we ever have faith in His mercy ?

As the Biblical story goes, unhappiness to man was the result of Adam's disobedience of God's injunction not to taste the forbidden fruit. But the poet asks : who created Adam ? Who created the Garden of Eden ? Cain and Lucifer are at cross in a dialogue in Byron's. *Cain*, about this mysterious tale of Adam's woe in God's Creation.

The purpose of Creation, the will of God to be many (एकोऽहंबहुस्याम्), the problem of evil, the problem of His deputies in many gods, the illusionism of the school of *vivarta-vada*—all

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these are serious problems which confront the philosophers. And despite the towering systems of philosophy built by the school of Plato, Spinoza or Hegel with their ethical & religious approach or by the school of Leibnitz, Locke and Hume with their purely scientific approach to the problem of Divinity, there is no answer for the hungry heart yearning for the soothing solicitude of that Mighty Power, in the daily toils and turmoils of human life. In the vast expansion of the universe, the poet Longfellow is content to leave Him smoking His peace-pipe.

"And the smoke rose slowly, slowly
Through the tranquil air of morning,
First a single line of darkness,
Then a denser bluer vapour.

.....

Till it touched the top of heaven,
Till it broke against the heaven,
And rolled outward all around it."

Eddington looks at Him as "Something, doing something, we do not know, what?", while Einstein "Cannot conceive of a God who rewards and punishes his creatures or has a will of the type of which we are conscious in ourselves." (*The World as I See it*, p. 5).

What is the contribution of the Vedic

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theology to these problems ? God created Law (ऋतम्) and Truth (सत्यम्) for the universe and Man has to work out his Karma according to that Law. As Prof. William Ernest Hocking observes in his book, *Science and the Idea of God*. "God is not to be the valet for my private wishes. He is not to disrupt for human ends the order of Nature established by Him for the foundation of the world. .... We should think of God as the element of objectivity in the order of values."

We shall examine these and other notions about God by collecting evidence from the Samhitā texts, which present in a nucleus form, the most sublime philosophy of the Creation of the universe (Rig-veda X, 129), the philosophy of the three eternals viz. God, Soul and Matter in Rig-veda I,164,20. and other problems on the concept of the cosmic Intelligence.

The White Yajur-veda gives a comprehensive concept of Gods' attributes as "the Bright, Bodiless, Woundless, Sinewless, the Pure, which evil hath not pierced. Far-sighted, wise, encompassing, He self-existent, hath prescribed aims, as propriety demands, unto the everlasting Years." (Griffith's Translation). The verse runs thus :

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स पर्य्यगाच्छुक्रमकायमव्रणमस्नाविरꣳ शुद्धमपापविद्धम् ।
कविर्मनीषी परिभूः स्वयम्भूर्याथातथ्यतोऽर्थान्
व्यदधाच्छाश्वतीभ्यः समाभ्यः ।

(*Yajur-veda*, XL, 8)

The Purusha-Sukta of the Rig-veda (X,90) describes Him thus :

सहस्रशीर्षा पुरुषः सहस्राक्षः सहस्रपात् ।
स भूमिं विश्वतो वृत्वात्यतिष्ठद्दशाङ्गुलम् ॥१॥
पुरुष एवेदं सर्वं यद्भूतं यच्च भाव्यम् ।
उतामृतत्वस्येशानो यदन्नेनातिरोहति ॥२॥
एतावानस्य महिमातो ज्यायांश्च पूरुषः ।
पादोऽस्य विश्वा भूतानि त्रिपादस्यामृतं दिवि ॥३॥

"The thousand-headed Purusha, thousand eyed, thousand footed, even He, encompassing the Universe on all sides remained over ten fingers in extent. Purusha alone is all this, that which has been and that which has to be. Moreover, He is the Lord of Immortality; and hence manifests Himself as the Universe evolving by means of food. Of this magnitude is His greatness, even greater than this is Purusha. One fourth of Him forms all created things, the Immortal three-fourth are in the regions beyond. Infinite, Absolute, Eternal, Changeless, the All is THAT."

As Rig-veda X, 129, 1, 2 testifies :

नासदासीन्नो सदासीत्तदानीम्.....आनीदवातं स्वधया तदेकं
तस्माद्धान्यन्न परः किं चनास ॥२॥

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"Then was not non-existence.....That alone breathed without air by His own nature. Apart from Him and beyond, there was naught."

His Incomprehensibility

The Kena or the Talavakāra Upanishad (II, 3) of the Sāma-veda clearly declares :

यस्यामतं तस्य मतं मतं यस्य न वेद सः ।
अविज्ञातं विजानतां विज्ञातमविजानताम् ॥

By him who thinks Brahman is not comprehended, Brahman is comprehended. He, who thinks that Brahman is comprehended does not know Him.

Brahman is unknown to those who think they know Him, and known to those who do not think to know Him.

The Infinite cannot be comprehended in words. As the poet rightly pressed Lord Buddha's feeling into expression:"OM, Amitāya!
Measure not with words The Immeasurable,
Nor sink the string of thought into the fathomless.
Who asks, doth err, who answers, errs.
Say naught !"

(*The Light of Asia*, Book VIII)

The statement of His incomprehensibility is confirmed by modern science. Eddington, the distinguished Scientist-astronomer calls

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Him, "Something, doing something, we do not know, what ?"

The conclusion was drawn on the basis of the observations made at the Mount Wilson Observatory with a 100 inches reflector marking a range of 500 million light years, "though the two-hundred inch reflector of Palomar will double that range enabling man to look upon whatever lies beyond. Perhaps it will reveal only new homogeneous oceans of space and new myriads of far galaxies whose antique light has swum to earth through a billion years of terrestrial time." (*The Universe and Dr. Einstein*, p. 118).

This reminds us of the famous declaration of the Purusha-Sukta (Rig-veda X, 90) viz. पादोऽस्य विश्वा भूतानि त्रिपादस्यामृतं दिवि—that one quarter of Him is manifest and three quarters are unmanifest, and it raises a doubt whether even with the 200 inches reflector the Scientist would be able to guarantee explorations beyond the one-quarter.

Now the unit of measurement in astronomical calculations is a light year, which is, 186000 x 60 x 60 x 24 x 365 miles.

In the far off spiral nebulae, each nebula being a partial universe, with an immense system of stars, the probable number of

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galaxies is a hundred thousand million, according to Eddington, and each of these contains an average of a hundred thousand million stars.

For facility of calculations, if the whole universe is taken as a sphere, the radius of this is to-day 3000 million light years long or 35 billion light years or in another view, 210,000,000,000,000,000,000,000 miles (22 zeroes), (*The Universe and Dr. Einstein*, p. 105) and after every 1300 million years according to Eddington (and after 2000 million years according to French astronomer, Mineur), this universe, like smoke of the gas pipe is getting double.

According to Eddington, 'Our Universe is like a soap bubble which will expand and expand till it bursts, although one cannot say to what, such a bursting will correspond.' According to the Dutch astronomer De Sitter, "Our universe-sphere having started with a comparatively small radius, has gradually expanded and this expansion will continue some thousands of millions of years still, and then an opposite process will intervene, and the Universe will begin to contract and go on contracting and this alternation or succession of expansions and contractions will continue

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for immeasurable ages.' (*Where Theosophy and Science Meet*, Dr. Kanga, Vol. I, p. 46). According to Hindu astronomers, this expansion goes on for a *Kalpa* which is 4,32,0000000 years, a day of Brahmā and the contraction goes on for a similar number of years in the night of Brahmā. The Hindu calculation of the age of the universe as about 1,96,70,00000 corresponds remarkably to the observations of modern Science according to which "the universe began to expand two billion years ago." (*The Universe and Dr. Einstein*, p. 115).

Maeterlinck observes : "Something is doing something we do not know what, writes Eddington." Is not this NESCIO QUID, which is the last word of our science, but a faint and vulgar echo of the magnificent avowal of the Sāma-veda saying of the Supreme Deity : "He who believes he knows it not, knows it; he who believes he knows it, knows it not at all. It is regarded as incomprehensible by those who know it most, and as perfectly known by those who are utterly ignorant of it." (*The Supreme Law*).

Source of Bliss

This "something", call Him what we will, God, Logos, Purusha, is the virtual controller of the Universe, in the language of the Katha-

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Upanishad. "He is one, the ruler, the inner soul of all beings, who renders His own nature manifold. The wise, who behold Him as dwelling in their own selves, for them is Eternal Bliss, not others,"

एको वशी सर्वभूतान्तरात्मा एकं रुपं बहुधा यः करोति ।
तमात्मस्थं येऽनुपश्यन्ति धीरास्तेषां सुखं शाश्वतं नेतरेषाम् ॥
(*Katha*, II, 5, 12)

This is an emphatic confirmation of what we read in the Yajur-veda.

वेदाहमेतं पुरुषं महान्तमादित्यवर्णं तमसः परस्तात् ।
तमेव विदित्वाति मृत्युमेति नान्यः पन्था विद्यतेऽयनाय ॥
(*Yajur-veda*, XXXI, 18)

'I know this Mighty Purusha, whose colour is like the Sun, beyond the reach of darkness.

He only who knows Him, leaves death behind him. There is no path save this, to the attainment of emancipation.'

Existence of God

The questions arise : Does such a God exist at all ? Is there any personal evidence for His existence ? Where did He fashion the worlds ?

When we examine these questions in the light of the texts available in the Vedas, we find a question raised in the Yajur-veda itself.

किंस्विदासीदधिष्ठानमारम्भणं कतमत्स्वित्कथासीत् ।
यतो भूमिं जनयन् विश्मकर्मा वि द्यामौर्णोन्महिना विश्वचक्षाः ॥
(*Yajur-veda*. XVII, 18)

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"What was the place whereon He took His stand ? What was it that upheld Him ? What was the manner ? Whence the Omnific Lord seeing all, producing the earth, disclosed the heavens with His might."

In the Rig-veda,a reference, as to the evidence or explicit testimony of some one witnessing the Creation is called for and answered :

को अद्धा वेद क इह प्रवोचत् कुत आजाता कुत इयं विसृष्टिः ।
अर्वाग्देवा अस्य विसर्जनेनाथा को वेद यत आबभूव ॥

(*Rig.* X, 129, 6)

Who verily knows and who can here declare it, whence it was born and whence came this varied Creation ? The learned sages were born after this world's production. Who knows then whence it first came into being? (Griffith).

The entire mystery of creation, according to Vedic evidence, is known only to God. As Rig-veda X, 129, 7, testifies :

इयं विसृष्टिर्यत आबभूव यदि वा दधे यदि वा न ।
योऽस्याध्यक्षः परमे व्योमन्त् सो अङ्ग वेद यदि वा न वेद ॥

He, the first Origin of this Creation upholds it. He is the Supervisor of even the highest heaven. He verily knows it and who knows it, if He also does not know, (or according to Griffith, 'He verily knows it or perhaps He knows not.')

As Haeckel puts it, "We do not know "the

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thing in itself" that lies behind these knowable phenomena. But why trouble about this enigmatic 'thing in itself' when we have no means of investigating it, when we do not even clearly know whether it exists or not ? Let us then leave the fruitless brooding over this ideal phantom to the 'pure metaphysician' and let us instead as 'real Physicists' rejoice in the immense progress which has been actually made by our monistic philosophy of nature." (*The Riddle of the Universe*, p. 310).

God is eternal and self existing and there can be no direct cognition of God, with the five senses-optic, auditory, olfactory. gustatory and tactile—or with the Mind,with light,sound, smell, taste and touch. But He exists. Voltaire says, "All nature cries out to us that He exists," which is the same as देवस्य पश्य काव्यम् in Atharva-veda X, 8, 32. All Nature is the Book of God. The atheistic character which the mechanical cosmognomy of Kant and Laplace revealed in old days is now disappearing and one cannot look at the Universe without a Cosmic and Intelligent Creator. It may be stated in passing that the famous French astronomer Laplace was asked by Napolean I, referring to his monumental work, *Mecanique Celeste*,"Laplace,they tell me,you have written

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this large book on the systems of the Universe and have never even mentioned its Creator." Laplace replied, "Sir, I had no need for any such hypothesis."

The world has changed since Laplace and as Dr. Morrison, former president of the New York Academy of Sciences observes in his book, *Man Does not Stand Alone*, " We are still in the dawn of the scientific age and every increase of light reveals more brightly the handiwork of an Intelligent Creator. In the ninety years since Darwin, we have made stupendous discoveries, with a spirit of scientific humility and of faith grounded in knowledge and we are approaching ever nearer to an awareness of God."

Reason and science are very much limited in their perspective of the ultimate reality which can be experienced only through intuitive insight, and spiritual endeavour, which in the words of Sri Aurobindo needs "a severity of introspective self-vision, an unsparing scrutiny of self-observation of which many Sadhakas and even Yogins are not capable." (*Letters*, Vol. I, p. 299).

God as Sacrificer in The Cosmic Sacrifice

The Purusha-Sukta in Rig. X, 90, which occurs also in Yaju. XXXI, 1 to 16 and in

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Atharva. XIX, 6 indicates that the Purusha, the universal spirit, animating all creatures performed the cosmic *Yajna*, out of which was born *virāj*—the mundane egg – and from *virāj* was born "the first man" (according to Colebrooke), he, as soon as born became manifested and afterwards created the earth and then corporeal forms. Rig. X, 90, 5.

तस्माद्विराढ़जायत विराजो अधि पूरुषः ।
स जातो अत्यरिच्यत पश्चाद्भूमिमथो पुरः ॥
(*Rig-veda* X, 90, 5)

"Virāj has been interpreted as the female principle, which, with the primal Purusha produces the Concrete Universe. In the Atharva-veda, She is an independent creative principle identified with the Spell (Brahma), with Speech, and with Prajāpati." (*A Source Book in Indian Philosophy*, Radhakrishnan and Moore, p. 19).

The process of Cosmic Sacrifice reveals that "when the gods performed the sacrifice with Purusha as the offering, then spring was its ghee, summer the fuel, and autumn, the oblation. (*Rig*. X, 90, 6).

यत्पुरुषेण हविषा देवा यज्ञमतन्वत ।
वसन्तो अस्यासीदाज्यं ग्रीष्म इध्मः शरद्धविः ॥

Then, as the sacrifice, on the strewn grass, they besprinkled the Purusha born in the beginning. With him the gods sacrificed, the

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sādhyas and the sages. (Rig. X, 90,7).

तं यज्ञं बर्हिषि प्रौक्षन्पुरुषं जातमग्रतः ।
तेन देवा अयजन्त साध्या ऋषयश्च ये ॥

From that sacrifice completely offered were born the verses (Rig-veda) and the Sāman-melodies (Sāma-veda). The metres were born from it. From it was born the Sacrificial formula (Yajur-veda).

तस्माद्यज्ञात्सर्वहुत ऋचः सामानि जज्ञिरे ।
छन्दांसि जज्ञिरे तस्माद्यजुस्तस्मादजायत ॥

(*Rig.* X, 90, 9)

From it were born horses and they that have two rows of teeth. Cattle were born from it. From it were born goats and sheep. (Rig. X, 90, 10).

Then follows the famous passage describing how the castes originated.

"When they divided the Purusha into how many parts did they arrange him ? What was his mouth ? What his two arms ? What were his thighs and feet called ?

The brāhmaṇa was his mouth, his two arms were made the rājanya (warrior), his two thighs the vaiśya (trader), from his feet, the śudra (servile class) was born.

ब्राह्मणोऽस्य मुखमासीद् बाहू राजन्यः कृत ।
उरू तदस्य यद्वैश्यः पद्भ्यां शूद्रो अजायत ॥

(*Rig.* X, 90, 12)

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The moon was born from His Mind,from His eyes was born the Sun, from His mouth, Indra and Agni, from His breath was Vāyu (Wind) born.

चन्द्रमा मनसो जातश्चक्षोः सूर्यो प्रजायत ।
मुखादिन्द्रश्चाग्निश्च प्राणाद्वायुरजायत ॥
(*Rig*. X, 90, 13)

And the process of saerifice is elegantly described, indicating the creation of the middle sky from his naval. The heaven originated from his head, the earth from his feet and the quarters from his ear.

And in the concluding verse, an ethical approach of a fundamental character is made viz. that with that Cosmic sacrifice, the gods sacrificed and gave the first ordinances to the world. Those great powers reached the firmament where are the ancient *sādhyas* and the gods.

यज्ञेन यज्ञमयजन्त देवास्तानि धर्माणि प्रथमान्यासन् ।
ते ह नाकं महिमानः सचन्त यत्र पूर्वे साध्याः सन्ति देवाः ॥
(*Rig*. X, 90, 16)

In chapter III,the Bhagavad-gitā,according to Dr. Belvelkar; is "making a very notable use of the Vedic conception of the *yajna* or Sacrifice as a Cosmological Principle and as an aid to liquidate one's prenatal debts to the the gods, the ancestors and the society in

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general." (*The Bhagavad Gitā*, Introduction, p. XXVIII).

The Bhagavad Gitā enjoins that, "The creation's Lord (Prajāpati) aforetime created the creatures along with the sacrifice, and said, "with this do ye bring forth. May this prove the yielder of your desired ends !"

सहयज्ञाः प्रजाः सृष्ट्वा पुरोवाच प्रजापतिः ।
अनेन प्रसविष्यध्वमेष वोऽस्त्विष्टकामधुक् ॥

(*Bhagavad Gita*, III, 10)

"With this spirit of sacrifice, you foster the gods, the great and illumined souls and may those great souls in turn foster you ! Fostering each other thus, ye shall gain the highest Good."

देवान्भावयतानेन ते देवा भावयन्तु वः ।
परस्परं भावयन्तः श्रेयः परमवाप्स्यथ ॥

(*Ibid.*, III, 11)

Modern Science is getting aware of this cosmological sacrifice and the superb control and management of the Intelligent Creator of the Universe, a management, in which the Sun's temperature, the Moon's distance, the angle of earth's rotation, tilted at 23° giving rise to seasons etc., are well controlled. All these are for the freeplay of the created beings and repayment of their pre-natal debts of *Karma* in conditions of perfect complacency

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and are so subtly and intelligently regulated that no scientist can believe that life could ever exist on earth, just by chance.

God's Mercy and Justice

Dr. Davidson observes, "Can astronomers show us anything in the universe as worthy of God's love as man ? The answer is that astronomers, as astronomers, are not in the least concerned about God's solicitude for man or indeed for anything else. Astronomers today believe that there are planetary systems associated with many of the stars and also that the existence of life on some of these planetary systems is quite probable. They do not think that God has any more solicitude for the forms of life on these planets, whatever the forms may be, than He has for human beings on this planet." (*The Stars and the Mind*).

True, that there is no solicitude of God for man in the day-to-day working of human nature, because man is a free agent and is a maker of his own destiny. But there is also no doubt that the 'merciful aspect' of God's creation lies in the rigid and impartial administration of the Universal Law in perfectly wholesome and harmonious conditions. So far and no further. Man as free-agent can perform his actions without the least interference from the Cosmic

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Power, whose Law is the only guide to him.

From the vedic point of view, as we have already explained in the Purusha-Sukta (*Rig-veda* X, 90), God has sacrificed Himself, as it were, and has fashioned the worlds, under conditions of living, which are suitable to the ease and harmony of man's working. This life, according to the vedic view, is neither " a tale told by an idiot, full of sound and fury, signifying nothing," (Shakespeare's *Macbeth*) nor is Man, "One of the gruesome results of this occasional failure of antiseptic precautions lacking the purifying protection of intense heat or the equally efficacious absolute cold of space," as one scientist avers. Man has definite obligations to discharge through a chain of *karma*, and making the whole world noble (कृण्वन्तो विश्वमार्यम्, *Rig-veda* IX) has to seek emancipation and riddance from the succession of births and deaths.

God is kind to man in providing suitable conditions. " I cannot believe, " said Einstein, "that God plays dice with the world." Einstein believed in a universe of law, order and harmony. God does not act as a valet for the fulfilment of man's desires and ambitions. Man is a free agent (कर्ता स्वतन्त्रः) and is rewarded or punished, according to his good or bad

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karma, the debit and credit account of which goes on in a succession of births, in a threefold chain of accumulated (सञ्चित), ripe and begun (प्रारब्ध) and independently continued (क्रियमाण) actions.

As Lord Buddha said,

"..... each man's life,
The outcome of his former living is,
The bygone wrongs bring forth sorrows
and woes,
The bygone right breeds bliss,
He cometh, reaper of the things he sowed.
Sesamum, corn, so much cast in past birth,
And so much weed and poison-stuff, which mar
Him and the aching earth."

(*The Light of Asia*).

Fulton Oursler, in his book '*The Precious Secret*'—a Cedar book, gives a chapter, entitled '*Seven Reasons Why a Scientist Believes in God*.' According to him, "The earth rotates on its axis at one thousand miles an hour, if it turned at one hundred miles an hour, our days and nights would be ten times as long as now, and the hot sun would, then, burn up our vegetation each long day, while in the long night any surviving sprout would freeze." Again, "the sun, source of our life, has a surface temperature of 12000° Fahrenheit, and our earth is

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just far enough away so that this 'eternal fire' warms us just enough and not too much ! If the sun gave off only one-half of its present radiation, we would freeze, and if it gave as much more, we would roast." (*The Precious Secret*, p. 23).

Further, "The slant of the earth, tilted at an angle of 23° gives us our seasons; if it had not been so tilted, vapours from the ocean would move north and south, piling up for us continents of ice." (*Ibid.*)

The distance of moon from the earth is 2,38,857 miles and the scientist argues, "if our moon were, say only fifty thousand miles away instead of its actual distance, our tides would be so enormous that twice a day all continents would be submerged,even the mountains would soon be eroded away !" (*Ibid.*)

God created Law (*rita*) for the universe and this law is applicable to all, rich and poor alike, with no distinction of caste, creed and colour. Man can make or mar his happiness by obeying or disobeying the Law. No outside agency interferes in human actions nor can divine omniscience go to the extent of knowing what a particular individual or nation will exactly do. The *tendencies* are there, and God is aware of those tendencies. He is ne-

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ither a partner nor an abettor-by-knowledge in the crimes of man, as some *Sufis* charge Him.

God's Omniscience

Let us examine a paradoxical question raised about God's omniscience in relation to man's responsibility for punishment in crimes. The questioner asks : "God being cognisant of the three periods of time, knows all things about the future and as God knows, so has the soul to act, consequently the soul ceases to be a free agent. God,therefore, cannot be justified in punishing it for its misdeeds, because it acts in accordance with what God foreknows."

On this, the observation of Swami Dayānanda, the great vedic savant and reformer of the nineteenth century is pregnant with logic. According to him:—

"It is foolishness to speak of God as being cognisant of the three periods of time, because what ceases to exist is called the past, and what does not exist now but will come into existence, is called the future. Now is there any kind of knowledge that ceases to exist with God or that He does not possess in the future ? Hence God's knowledge is always uniform and uninterrupted. He always lives in the timeless present. The past and the future relate to the human soul only. It is true

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though that the knowledge of the three periods of time can be said to exist in God when it is spoken of in relation to the actions of the soul, but not absolutely. As the soul acts by virtue of its free will, so does God know what it does, by virtue of His omniscience, and as God knows, so the soul acts. In other words, God possesses the knowledge of the past, the present, and the future and gives souls their deserts; whilst the soul is a free-agent in whatever it does and in possessing limited knowledge of the present." (*Satyārtha Prakāsha*, Chapter VII, p. 208).

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CHAPTER II

THE ONE GOD OR THE MANY GODS

Monotheism, Polytheism or Henotheism ?

In the previous chapter, we have attempted a definition of God. We have noticed on the basis of shrewd and perceptive analysis of Science, supported by the Vedic citations, that God is a conscious controller. He has performed a sacrifice, in designing this Universe, so that Man, the Crown of Creation, can fulfil his *Karmic* obligations in conditions of entire complacency and integration. provided by Nature.

The question now arises, whether there is one God or many gods controlling the Universe .?

The Vedas advocate Monothesim. Aurobindo Ghosh rightly observes, "The Vedic deities are names, powers, personalities of the Universal Godhead and they represent each some essential puissance of the Divine Being. They manifest the Cosmos and are manifest in it." (*Hymns to the Mystic Fire, Foreword*, p. 34).

We cite below, the oft-quoted Samhita text which clearly shows that MONOTHEISM is

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the doctrine advocated in the Vedas. In Rig-veda 1,164,46 we have: –

इन्द्रं मित्रं वरुणमग्निमाहुरथो दिव्यः स सुपर्णो गरुत्मान् ।
एकं सद्विप्रा बहुधा वदन्त्यग्निं यमं मातरिश्वानमाहुः ॥

'They call Him Indra, (God of supreme power), Mitra, (the friend of all), Varuna (the most desirable being), Agni (the all knowing) Divya, (the shining one) and Garutman (the mighty soul).

The sages describe the One Being in various ways, calling Him, Agni, Yama and Mātrishwan.'

As Earnest Wood testifies, "In the eyes of the Hindus, there is but One supreme God. This was stated long ago in the Rig-veda in the following words 'Ekam Sad Vipra Bahudha Vadanti,' which may be translated 'The sages name the one Being variously." (*An Englishman Defends Mother India*, p. 128).

Max Muller observes, "Whatever may be the age, when the collection of our Rig-veda Samhitā was finished, it was before that age that the conception had been formed that there is but one Being,neither male nor female, a Being raised high above all the conditions and limitations of personality and of human nature and nevertheless, the Being that was really meant by all such names as Indra, Agni,

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Mātrishvān, and by the name of Prajāpati-Lord of Creation." (*Six Systems of Indian Philosophy*).

We cite below several other mantras which clearly uphold monotheism :

य एक इत् तमु ष्टुहि कृष्टीनां विचर्षणिः । पतिर्जज्ञ वृषक्रतुः ॥

O man ! Praise Him who is one and one only, being the Almighty and Omniscient Lord of all beings. (*Rig-veda*, VI, 45, 16).

य एक इद् हव्यश्चर्षणीनामिन्द्रं तं गीर्भिरभ्यर्च आभिः ।
यं पत्यते वृषभो वृष्णयावान् सत्यः सत्वा पुरुमायः सहस्वान् ॥
(*Rig-veda*, VI, 22, 1)

"With these my hymns, I glorify that Indra who is alone to be invoked by mortals, the Lord, the Mighty One, of manly vigour, victorious, hero, true and full of wisdom." (Griffith).

मा चिदन्यद् विशंसत सखायो मा रिषण्यत ।
इन्द्रमित् स्तोता वृषण सचासुते मुहुरुक्था च शसत ॥
(*Rig-veda*, VIII, 1, 1)

Glorify naught besides, O friends; so shall no sorrow trouble you. Praise only mighty Indra when the juice is shed, and say your lauds repeatedly. (Griffith).

विश्वकर्मा विमना आद् विहाया धाता विधाता परमोत् सन्दृक् ।
तेषामिष्टानि समिषा मदन्ति यत्रा सप्त ऋषीन् पर एकमाहुः ॥
(*Rig-veda*, X, 82, 2)

Mighty in mind and power is Viśvakarman,

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maker, disposer and of most lofty Presence. Their offerings, enjoy in rich juice, where they value ONE only–ONE beyond the Seven Rishis. (Griffith).

यो नः पिता जनिता यो विधाता धामानि वेद भुवनानि विश्वा ।
यो देवानां नामधा एक एव तं सं प्रश्नं भुवना यन्त्यन्या ॥
(*Rig-veda*, X, 82,3)

"Father who made us, He, who as disposer knoweth all races and all things existing. Even He alone, the deities' name-giver, Him, other beings seek for information." (Griffith).

In Atharva. XIII, 4 repeated emphasis is laid on the Oneness of the Divinity, by telling the worshippers that He is neither second, nor third, nor fourth nor fifth nor sixth, nor seventh, nor eighth, nor ninth, nor even the tenth.

य एतं देवमेकवृत वेद ।
न द्वितीयो न तृतीयश्चतुर्थो नाप्युच्यते ॥
न पञ्चमो न षष्ठः सप्तमो नाप्युच्यते ।
नाष्टमो न नवमो दशमो नाप्युच्यते ॥
(*Atharv*. XIII, 4)

Also सुपर्णं विप्राः कवयो वचोभिः ।
एकं सन्तं बहुधा कल्पयन्ति ॥
(*Rig-veda* X, 114, 5)

"The wise seers through their praise make into many forms, the bird, (God) which is only one." (Wilson).

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Rig-veda Book X Hymn 121

The 121st hymn of the tenth Book of the Rig-veda speaks of monothesim beyond the least shadow of doubt.

On this hymn, Max Muller observes, "I add only one more hymn (Rig-veda, X, 121), in which the idea of one God is expressed with such power and decision, that it will make us hesitate before we deny to the Aryans an instinctive Monotheism." (*History of Ancient Sanskrit Literature*, p. 578).

We quote a few verses from that hymn to point out repeated emphasis on the oneness of God.

हिरण्यगर्भः समवर्तताग्रे भूतस्य जातः पतिरेक आसीत् ।
स दाधार पृथिवीं द्यामुतेमां *कस्मै देवाय हविषा विधेम ॥
(*Rig-veda*, X, 121,1)

"In the beginning rose Hiranyagarbha, born, only Lord of all created beings. He fixed and holdeth up this earth and heaven." (Griffith).

यश्चिदापो महिना पर्यपश्यद् दक्षं दधाना जनयन्तीर्यज्ञम् ।
यो देवेष्वधि देव एक आसीत् *कस्मै देवाय हविषा विधेम ॥
(*Rig-veda*, X, 121, 8)

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* A word about कस्मै देवाय हविषा विधेम is essential, because the explanation of the word कः has raised lot of controversy. Most of the oriental scholars translate this as a question mark, "To which God shall we offer worship ?" vide Ma-

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He in His might, surveyed the floods containing productive force and generating worship.

He is the God of Gods, and none besides Him. (Griffith)

Count Bjornstjerna rightly observes, "These truly sublime ideas cannot fail to convince us that the Vedas recognize only One God who is Almighty, Infinite, Eternal; Self-existent, the Light and Lord of the Universe." (*Theogony of the Hindus*, p. 53).

Fardun Dadachanji, a Parsi writer of repute, referring to the Vedic Monotheism, writes :

"The Vedas teach nothing but Monotheism of the purest kind, the belief that this Universe manifests, the love, might, wisdom and glory of God who eternally evolves and dis-

*cdonnell, *History of Sanskrit Literature.*)

If we examine its implication by referring to the Brāhmanās, we find that the epithet Ka क: means प्रजापति: God, को हि प्रजापति: (शतपथ ब्राह्मण ६, २२, ५)

There is,therefore,no question of the Āryan seers being uncertain about the God to whom they could offer worship. They knew that it was Prajāpati alone, with all His well known appellations, whom they were called upon to worship.

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solves alternately innumerable systems of worlds, for the benefit, discipline and well-being of jeevatmas, according to the eternal laws of Nature (called *Rita* in the Vedas) and also according to the laws of *Karma*." (*Philosophy of Zoroastrianism and Comparative Study of Religions*, p. 10).

Max Muller and Henotheism in the Vedas

Before concluding,we have to examine Max Muller's charge of Henotheism in the vedas. According to him, "Each vedic poet seems to exalt the particular god whom he happens to be singing to a position of supermacy.

It would be easy to find, in the numerous hymns of the Veda, passages in which almost every single god is represented as supreme and absolute.

In the first hymn of the second Book of the Rig-veda, Agni is called the ruler of the Universe, the Lord of men, the wise King, the father, the brother, the Sun,the friend of men-, nay all the power and names of the others are distinctly ascribed to Agni.

Indra is celebrated as the strongest in the hymns as well as in the Brahmanas and the burden of one of the songs of the tenth Book is :

Vishvasmad Indra Uttarah. Indra is greater

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than all.

Of Soma it is said that he was born great, and that he conquers every one. He is called the king of the world, he has the power to prolong the life of men and is the maker of heaven and earth; of Agni, of Surya, of Indra and Vishṇu. In the very next hymn, addressed to Varuṇa, it is the Varuna, who is to the mind of the poet Supreme and Almighty." (*Ancient Sanskrit Literature*, p. 353).

Once we have established on the basis of references to the Samhitā text, that the ancient seers recognized nothing but monotheism, the explanation of the apparently Heno-theistic approach on the part of the seers, in invoking the various deities becomes simple and clear. Max Muller himself read Monotheism in the vedas (vide his observation *cited Supra* in *History of Ancient Sanskrit Literature*, p. 578), but it probably was an awkward situation for him to find each god separately applauded to the extreme. The anamoly arises only when once it is forgotten that the different gods who are invoked for self or power are the 'parts of One Stupendous Whole,' nay the very same One, Agni, Yama, Soma, Surya etc., all one, with different attributes of the same Divinity.

The anthromorphic character in which

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these deities find expression and adoration in the Vedas is full of interest but they are expressions of the One Supreme Power, in poetic invocation. They are invoked by the sages to come, to take their seats (सीद् सादनम् *Rig-veda* II, 23, 1), to partake of the offerings, to listen to their psalms. Indra is delineated as a warrior and protector. His valour is such that he alone overcame the hundred armies (शतं सेना अजयत् साकमिन्द्रः). His wife is also auspicious, and he has all enjoyable things at his place. (कल्याणीर्जाया सुरणं गृहे ते *Rig-veda*, III, 53, 6). He had to fight his enemies for years. Śambara was one of his main antagonists, and it was after the lapse of full forty years that Indra could get at him (यः शम्बरं पर्वतेषु क्षियन्तं चत्वारिंश्यां शरद्यन्वविन्दत (*Rig-veda*, II,12,11).

Indra took the help of his friend Viṣṇu, while attacking Vritra.

अथब्रावीद् वृत्रमिन्द्रो हनिष्यन्त्सखे विष्णो वितरं विक्रमस्व ॥

Both Indra and Viṣṇu jointly put down to pieces the ninety nine strongholds of Śambara. There are many such feats which glorify Indra's valour.

But Indra is a deity, one of the Creations of God, (मुखादिन्द्रश्चाग्निश्च *Rig*. X, 90, 13) Divine Excellence or His विभूतिः ।

And although represented and adored,

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either as mere Sun (आधिभौतिक) or as superintending deity of fire (आधिदैविक) or as individual soul (आध्यात्मिक), Indra is the same as Agni, the same as Varuṇa, the Supreme God in the ultimate purpose and connotation of the vedas.

Agni connotes God because He is omniscient and worthy of adoration, Agni from √अञ्चु to worship.

Vāyu connotes God because He is the life and support of the Universe, the cause of its dissolution. It is derived from √वा to move.

Mitra connotes God because He loves all and is the friend of all. It is derived from √ निमिदा to love.

Indra connotes God because He is all-effulgent. It is derived from √इदि to empower.

Vishnu connotes God because He is all-pervading. It is derived from √विष्ट्

Brahmā connotes God because He is the Lord of all. It is derived from √वृह् to overlord.

Yama connotes God because He governs all and is the dispenser of justice. Thus it is said, एक एव नमस्यो विक्ष्वीड्य (*Atharv.* II, 2, 1)

Lord of the world, only He should be honoured.

एक एव नमस्यः सुशेवाः (*Atharv.* II, 2, 2)

Lord of the world, the friendly God who alone must be worshipped. (Griffith).

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सोऽर्यमा स वरुणः स रुद्रः स महादेवः (*Atharv.* XIII,4,4)

Rudra and Mahādeva, He is called Aryaman and Varuṇa.

तदेवाग्निस्तदादित्यस्तद् वायुस्तदु चन्द्रमाः ।
तदेव शुक्रं तद्ब्रह्म ता आपः स प्रजापतिः ॥
(*Yajur.* XXXII, 1)

'Agni is that, the Sun is that, Vāyu and Chandramas are that. The Bright is that, Brahma is that, those waters, that Prajāpati.' (Griffith).

सो अग्निः स उ सूर्यः स उ एव महायमः (*Atharv* 13, 4, 5)

He is Agni, the self-refulgent, the Surya the impellor and Creator, the Mahayama, the great administrator and disciplinarian.

It is clear, therefore, that there is no place for Henotheism in the vedas and Max Muller's statement may be read in the light of the clarification already offered.

A C. Clayton's observation which is a reply to Max Muller's charge is significant in this connection. He writes, "In his writings, Max Muller constantly referred to this and coined the word *Henotheism* or *Kathenotheism* to express, what he regarded as a 'peculiar character' of the ancient vedic religion. It denotes that each of the several divinities is regarded as supreme and worshipped without reference to the rest or that the seers held the

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belief in individual gods alternately, or for the time being regarded as highest, the one, that was being worshipped and that they, therefore, treated him as if he were absolutely independent and supreme, alone present to the mind of the worshipper. More modern scholars do not, however, consider this practice so remarkable as Max Muller did. They regard it more as a species of poetic license, by which a singer magnified the god whom he was invoking, rather than an evidence that the poet,actually, claimed that the god whom he was then reverencing was the Superior of all others." (*The Rigveda and Vedic Religion*, p. 59).

Vehemently criticising this coinage of Henotheism, Aurbindo Ghosh observes,

"What is the main positive issue in this matter ? An interpretation of the veda must stand or fall by its central conception of the vedic religion and the amount of support given to it by the intrinsic evidence of the veda itself. The Vedic hymns are chanted to the One Deity under many names, names which are used and even designed to express His qualities and powers.....Agni contains all other divine powers within himself, the Maruts are described as all the gods. One deity is addressed by the names of others as

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well as his own, or most commonly, he is given as lord and King of the Universe, attributes only to the Supreme Deity." (*Dayananda and the Veda*, p. 17).

Questioning the very rectitude of holding any doctrine other than monotheism in the Vedas, Sri Aurbindo asks, "But why should not the foundation of vedic thought be natural monotheism, rather than this new fangled monstrosity of henotheism?"

"Well, because primitive barbarians could not possibly have risen to such high conceptions and if you allow them to have so risen, you imperil our theory of the evolutionary stages of the human development and you destroy our whole idea about the sense of the vedic hymns and their place in the history of mankind." (*Ibid.*, p. 18).

We need not dilate upon the doctrine any further. It is clear that the vedic hymns do not propound either polytheism, henotheism or the so-called devatā-vāda, and we close this chapter with a realistic observation of Dr. Radhakrishnan on the word 'Deva' which is the root of this controversy.

"An important point to be borne in mind in discussion is this that the word *Deva* is so very elusive in its nature and is used to indi-

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cate many different things. Deva is one who gives to man. God is *Deva* because He gives the whole world. The learned man who imparts knowledge to fellowman is also a *deva*. The Sun, the moon and the sky are *devas* because they give light to all Creation. Father and mother and spiritual guides are also *devas* Even a guest is *deva*."

The Thirty-three Devatas ?

The vedic text referring to the 33 devatas is cited below :

त्रयस्त्रिंशता स्तुवत भूतान्यशाम्यन्
प्रजापतिः परमेष्ठ्यधिपतिरासीत् ॥ (*Yajur*. XIV, 31)

"The Lord of all, the ruler of the Universe the Sustainer of all, holds all things by means of thirty-three gods."

The Śatapatha Brāhmana elucidates who these 33 devatas are. They are listed in the 14th chapter as under,

(a) *Eight Vasus*

(i) अग्नि (ii) पृथ्वी (iii) वायु (iv) अन्तरिक्ष (v) आकाश (vi) सूर्य (vii) चन्द्रमा (viii) नक्षत्र ।

These are called *vasus* because they are the abode of all that is existent.

(b) *Eleven Rudras*

(i) Ten Prānās—the vital forces

(ii) Human spirit

These are called *Rudras*, because when they

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depart from the body, they cause the relations of the deceased person to weep.

(c) *Twelve Adityas.* The twelve months of a year are the twelve Adityas as they cause the lapse of the term of life of each object.

(d) *Indra.* This is the all-pervading electric energy productive of a mighty force in the Universe.

(e) *Prajapati* i e. Yajna.

Yajna is known as Prajāpati, because, it gives light and power to mankind by the purification of air, water, rain, vegetables.

We cite below the main text of the 'Satapatha Brāhmana' in this connection.

त्रयस्त्रिंशत् त्वेव देवा इति कतमे ते त्रयस्त्रिंशत् । इत्यष्टौ वसवः एकादश रुद्राः द्वादशादित्याः त एकत्रिंशत् इन्द्रश्चैव प्रजापतिश्च त्रयस्त्रिंशाविति । कतमे वसव इति । अग्निश्च पृथिवी च वायुश्चान्तरिक्षं च आदित्यश्च चन्द्रमाश्च नक्षत्राणि चैते वसवः एतेषु हीदं सर्वं वसु हितम् । एते हीदं सर्वं वासयन्ते तद् यदिदं सर्वं वासयन्ते तस्माद् वसव इति । कतमे रुद्रा इति । दशेमे पुरुषे प्राणाः आत्मैकादशते यदास्मान्मर्त्याच्छरीरादुत्क्रामन्ति अथ रोदयन्ति तद् यद् रोदयन्ति तस्माद् रुद्रा इति ॥

कतम आदित्या इति । द्वादशमासाः संवत्सरस्य एत आदित्याः एते हीदं सर्वम् आददाना यन्ति तद् यदिदं सर्वमाददाना यन्ति तस्मादादित्या इति । कतम इन्द्रः कतमः प्रजापतिरिति स्तनयित्नुरेवेन्द्रः यज्ञः प्रजापतिरिति ॥

(*Satapatha Brahmana*, XIV, 5)

According to Dayānanda, "These thirty-

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three aforesaid entities are called Devatās by virtue of possessing useful properties and actions. Being Lord of all and greater than all, the supreme being is called the thirty-fourth devatā who alone is to be worshipped. The same thing is written in the other Shāstras. Had people consulted these books, they would not have fallen into this error, viz. the belief that there are more gods than one mentioned in the vedas. (*Light of Truth*, p. 191).

On the connotation of the epithet *Deva*, Max Muller observes thus:—

"Deva meant originally bright and nothing else, meaning bright, it was constantly used of the sky, the stars, the sun, the dawn, the day, the spring, the rivers, the earth.

And when a poet wished to speak to all these by one and the same word, by what we should call a general term, he called them all Devas. When that had been done, Deva did no longer mean the Bright only, but the name comprehended all the qualities which the sky, and the sun and the dawn shared in common, excluding only those that were peculiar to each.

Here you see how, by the simplest process, the Devas, the bright ones might become and

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did become the Devas, the heavenly, the kind the powerful, the invisible, the immortal." (*India, What can It Teach Us*, p. 218).

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CHAPTER III

THE BASIS OF IMAGE WORSHIP IN THE VEDAS

Image-worship is of the deities and never of the Supreme Being and seems to have been introduced in the post-vedic period by the followers of the *bhakti* cult as a preliminary step to yogic sādhanā. As we shall clarify, towards the end of this chapter, the attributes of the One God were symbolised and then deified in the form of various gods, Brahmā, Viṣṇu, Śiva and so on.

The Samhitā text declares incontrovertibly that there is no image of That, whose appellation is "The Great, the Glorious."

न तस्य प्रतिमाऽस्ति यस्य नाम महद्यश : ॥

(*Yajur-veda*, XXXII, 3)

Two Vedic Texts Examined

There are two verses which have been shown as referring to image worship in the Samhitā, by the Pauraṇic school of Indian thought. Dr. Krishna Datta Bharadwaja, while repeating the vedic passage, often quoted by Keith and others, asserts : "Reference to re-

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verence for a stone (image) presided over by the deity is very old and is to be found in a verse of the *Atharvaveda.*

ऋषीणां प्रस्तरोऽसि नमोऽस्तु दैवाय प्रस्तराय ॥

(*Atharva.* XVI, 2, 6)"

(*The Philosophy of Ramanuja*, p. 192)

And he says, further, " There seems to be hardly any doubt about the fact that image worship was in vogue even in the vedic period. The *Rigveda* has recorded in IV, 24, 10, a query of Vāmadeva, as to who will purchase his Indra for ten cows. Such an Indra cannot be anything else than an image of Indra.

क इमं दशभिर्ममेन्द्रं क्रीणाति धेनुभि : ॥" (*Ibid.*)

Let us examine the correct interpretation of these two texts.

(a) *Atharvaveda* XVI, 2, 6

According to Griffith, the verse means, "Thou are the couch of the Rishis. Let worship be paid to the divine couch." The word 'couch' is here taken to imply, shelter, refuge, ultimate resort, the goal, the ideal and has no bearing on the deification of the Deity. To take प्रस्तर to mean only a stony slab, an image of God made in stone, is not supported by internal evidence in the Samhitā.

(b) *Rigveda* IV, 24, 10, *Vamadeva's query*:—

Indra is विद्युत् 'electricity' and the cows are

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the rays of the Sun. Indra is आत्मा according to Śatapatha Brahmana's interpretation (इन्द्रो वै आत्मा) and the ten cows are the ten senses.

To interpret the text as referring to the marketing of the image of Indra at a cost of ten cows, is getting too literal with the vedic interpretation, and it need hardly be stressed, that even the laborious European Indologists, have not been able to get out of this difficulty.

There are several instances where gross injustice has been done to the interpretation of the vedic mantras, which are virtually "a mirror of Eternal Wisdom," by overlooking the complete references and evidences available, both internally and externally.

An instance may be cited when a scholar like Griffith refused to translate a few verses in the *Yajurveda* on the ground that they were utterly obscene.

In relation to *Yajurveda* chapter XXIII, Griffith writes, "These verses twenty, and the following nine stanzas are not reproducible even in the semi-obscurity of a learned European language, and stanzas 30 and 31 would be unintelligible without them."

What real explanation could be given of this portion of the Aśvamedha Sukta of the *Yajurveda* and how Dr. A. Venus, Principal

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of the Banaras Sanskrit College and successor to Griffith, reacted to this opinion, will be taken up in a separate treatise, when we are examining some of the western scholars on interpretation of a few of the vedic texts, but in reference to the above quoted *Rigvedic* text, stretched to connote image worship, we have only to say this much, that Indra here refers to Ātmā इन्द्रो वै आत्मा and the धेनवः do not imply 'ten cows', but the ten senses. The query relates to the chivalry of that man, who could purchase the soul, by conquering his ten senses. Truly declares Lord Krishna,

इन्द्रियाणि प्रमाथीनि हरन्ति प्रसभं मनः॥(*Bhagavad Gita*)

'The ten senses are most disturbing to the mental equipoise.'

Thus in Vāmadeva's query, there is no purchase of an image, but it is a victory over the ten senses, after which, one is entitled to the purchase of soul.

It is only in the later Pauraṇic literature that we find images being made, but there is nothing to show, conclusively, whether the images were of the nature of market toys or were meant to deify God. *The Bhāgavata Puraṇa* XI, 27, 12, has a reference to idols, sculpture and clay modelling.

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लौही दारुमयी शैली, लेप्या लेख्यां च सैकती ।
मनोमयी मणिमयी प्रतिमाष्टविधा स्मृता ॥

Symbolism in Image-worship

Swami Vivekanada writes,

"Unity in variety, is the plan of nature and the Hindu has recognised it. Every other religion lays down certain fixed dogmas and tries to force on society only one coat which must fit Jack and John and Henry all alike. If it does not fit John or Henry he must go without a coat to cover his body. The Hindus have discovered that the Absolute can only be realised or thought of or stated through the relative, and the images, crosses, crescents are simply so many symbols, so many legs, to hang the spiritual ideas on." (*Essentials of Hinduism*, p. 46).

The Hindus associate their ideas of omnipresence of God, His holiness, His purity through images of the deities. Every worshipper knows that image is not God, it is not omnipresent, but he argues that it is made with a view to fixing his mind on that Power. It helps him to concentrate upon the various attributes of Divinity, coloured and sculptured through the images. To that extent the cross of the Christian, the crescent of the Muslim and the idol of the Hindu is permissible

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but superstition does not take him beyond. The whole life is spent by him in worshipping the image without rising higher.

As is aptly said,

"Man is to become divine by realising the divine, idols or temples or churches or books are only the supports, the helps, of his spiritual childhood, but on and on he must progress."

Image-worship has no universal recognition in Hinduism nor is it compulsory but images are drawn by worshippers as external symbols of deities. This symbolism is peculiarly interesting. In a small treatise like this, it will be enough to take one or two instances.

In Gaṇapati worship, the face of Ganapati is of an elephant (गज). Now गज is symbolic of Brahmā, for it is maintained by the devotees that,

समाधिना योगिनो यत्र गच्छन्तीति गः

and यस्माद् बिम्बप्रतिविम्बतया प्रणवात्मकं जगत् जायते इति जः

Ganapati is called एकदन्त having only one tooth, the right one. The number एक represents illusion, and दन्त refers to Brahman.

So on, so forth. Other symbols of वक्रतुण्ड, लम्बोदर, शूर्पकर्ण and मूषकवाहन etc. are similarly explainable. For further details reference may be made to मौद्गलपुराण.

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As regards the image of Śiva, we find him besmeared with dust. This symbolises the dust of knowledge which destroys ignorance. Compare, what the devotee says :

ज्ञानाग्निः सर्वकर्माणि भस्मसात् कुरुतेकिल । तेनैव भस्मना गात्रमुद्धूलयति धूर्जटिः ॥

His roaming about in the cemetry grounds in thus conceived,

नित्यं क्रीडति यत्रायं स्वयं संसारभैरवः ।
तत्र शमशाने संसारे शिवः सर्वत्र दृश्यते ॥

This world itself is like a cemetry ground in which Śiva, the omnipresent God, is seen everywhere.

Similar explantions are given by the devotees about the त्रिशूल, the भुजगभूषण the त्रिनेत्रता and वृषभवाहन of Śiva, who is regarded as an idol of Brahman, the Universal Lord.

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CHAPTER IV

THE CONCEPT OF MĀYĀ IN THE VEDAS

Vedic References to Māyā

The *Rigveda* VI, 47, 18 contains the word Māyā and is translated as "In every figure, He hath been the model, that is His only form for us to look on. Indra moves multiform by His illusions." (Griffith).

The verse runs thus :

रूपं रूपं प्रतिरूपो बभूव तदस्य रूपं प्रतिचक्षणाय ।
इन्द्रो मायाभिः पुरूरुप ईयते युक्ता ह्यस्य हरयः शता दश ॥

(*Rig-veda*, VI, 47, 18)

This verse is often quoted to support the conception of Māyā in the vedas. Māyā is here interpreted as illusion, and the whole verse is taken as the basis of the Māyāvāda in the post vedic period. But this approach is incorrect and is unsupported by evidence in the Samhita text.

The word Māyā, which is derived from the root √मा to measure, does not mean 'illusion', but implies Divine Glory or Power, with the significance that the entire universe of Indra (God) is the *measure* and manifestation of His glory and His wisdom.

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The word Māyā occurs in the *Rigveda* about seventy times in one form or the other, and twentyseven times in the *Atharva-veda* but everywhere Sāyana and other vedic commentators take it to mean प्रज्ञा or ज्ञानविशेष i.e. Purified intellect or special knowledge. At one place in the *Yajurveda*, Uvvat, a vedic commentator of the eleventh century A.D. has translated the word आसुरी माया as प्राण-सम्बन्धिनी प्रज्ञा "or knowledge concerning the vital airs."

The word *Māyā* has never been used in the vedas in the sense of Cosmic Ignorance or illusion or Dream of the Infinite.

Dr. Radhakrishnan confirms it and observes, "Wherever the word Māyā occurs in the *Rigveda*, it is used only to signify the Might or the Power." According to him, "We see clearly that there is no basis of any conception of the unreality of the world in the hymns of the *Rigveda*. This world is not a purposeless phantasm, but is just the evolution of God."

The Nāsadīya hymn of the Rigveda, sets at naught, the theory of illusion.

The Nāsadiya Sukta (*Rigveda*, X, 129)

The Nāsadīya hymn of the *Rigveda*, X, 129 which propounds the reality of the creation of the universe is the finest specimen of philo-

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sophical thought, a precursor of Indian philosophy, with a poetic excellence and vividness of imagery, unsurpassed in the vedic literature. This hymn completely sets off all idea ofillusion in God. The hymn propounds that there was neither the *Asat* (the manifested cosmos) nor the *Sat* (first stage of matter evolved out of the primordial matter for creation of the universe) nor were there the nebulae, nor the sky beyond them.

नासदासीन्नो सदासीत्तदानीं । नासीद्रजो नो व्योमा परो यत् ॥

There was something which covered all like a haze, but it could not be of such unfathomed depth, as to cover Him, the holy Brahma.

किमावरीवः कुहकस्य शर्मन् अम्भः किमासीद्गहनं गभीरम् ।
न मृत्युरासीदमृतं न तर्हि न रात्र्या अह्न आसीत्प्रकेतः ।
आनीदवातं स्वधया तदेकं तस्माद्धान्यन्न परः किं चन्न नास॥

There was no death, nor any life immortal there was no night, no day, only God Himself breathed, windless, by His own inherent might, beyond Him no other thing existed.

तम आसीत्तमसा गूढमग्रे अप्रकेतं सलिलं सर्वमा इदम् ।
तुच्छ्येनाभ्वपिहितं यदासीत् तपसस्तन्महिना जायतैकम् ॥

(*Rigveda*, X, 129, 3)

In the beginning there was darkness. This all, was concealed in darkness, and there was undiscriminated chaos. Whatever there was,

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was void and formless. *The One created the Cosmos by His greatness and might.*

We need not quote the entire hymn. Suffice it to say in the words of Prof. Deussen, "If the world be regarded as baseless, as not rooted in any reality, having its origination in non-being, then we shall have to repudiate all reality even that of Brahman. Unreal the world is-illusory it is not."

Prof. Macdonell, gives a beautiful poetic rendering of this Nāsadīya Sukta, as under :

(1)

Non-being, then existed not, nor being,
There was no air, nor sky that is beyond it,
What was concealed ? Wherein? In whose
protection ?
And was there deep unfathomable water ?

(2)

Death then existed not, nor life immortal,
Of neither night nor day was any token,
By its inherent force, the one breathed windless
No other thing than that beyond existed.

(3)

Darkness there was at first by darkness hidden,
Without distinctive marks, this all was water,
That which becoming, by the void, was covered,
That One by force of heat came into being.

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(4)

Desire entered the One in the beginning,
It was the earliest seed of thought, the product,
The sages searching in their hearts with wisdom,
Found out the bond of being in non-being.

(5)

Their ray extended light across the darkness,
But was the One above or was it under ?
Creative force was there aud fertile power,
Below was energy, above was impulse.

(6)

Who knows for certain? Who shall here
declare it ?
Whence was it born, and whence came this
creation ?
The gods were born after the world's creation,
Then who can know from whence it has arisen.

(7)

None knoweth whence creation has arisen,
And whether he has or has not produced it,
He who surveys it in the highest heaven,
He only knows or haply he may know not.

God is real and His creation is real. We see an affirmation in the clearest words in *Rigveda*, II, 15, 1.

प्रद्यान्वस्य महतो महानि सत्या सत्यस्य करणानि वोचम्.॥

"Now verily shall I declare the workings, mighty and true,of Him,the True and Mighty."

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Rigveda, X, 55, 6 states that whatever God knows, this universe is truth and not idle or illusory.

यच्चिकेत सत्यमित् तन्न मोघम् ।

Rigveda II, 12, 2 states that God solidified the molten earth. He stabilised the moving mountains. He created the heavenly regions and firmly fixed the skies.

यः पृथिवीं व्यथमानामधृंहद् यः पर्वतान् प्रकुपितां अरम्णात् ।
यो अन्तरिक्षं विममे वरीयो यो द्यामस्तभ्नात् स जनास इन्द्रः ॥

(*Rigveda*, II, 12, 2)

The Pauranic View

One of the functions of the Purānas is stated to be the delineation of the origin of the universe.

सर्गश्च प्रतिसर्गश्च वंशो मन्वन्तराणि च ।
वंशानुचरितं चेति पुराणं पञ्चलक्षणम् ॥

In this connection, *the Bhāgvata-Puarana* clearly holds that this universe was manifested by God There is no reference to the illusionary character of the universe. According to this Purāna :

कल्पान्ते कालसृष्टेन योऽन्धेन तमसावृतम् ।
अभिव्यनक् जगदिदम्, स्वयं रोचिः स्वरोचिषा ॥

At the end of the Kalpa, the self-illuminous Lord manifested this world which was enveloped by blinding darkness wrought by time, through His Self-Illuminous Power.

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The First Denial of World's Reality

The first denial of world's reality is believed to have started from Gaudapāda whose disciple Govind was Śankara's Guru, but his exposition of the third and fourth parts of the *Māndukya Kārikā* wherein, he propounds the Māyāvāda, was a mere adjustment of the Buddhistic doctrines. Śankara also knew that the negative philosophy of the Buddhists had ceased to appeal to the masses and that, to quote Dr. Radhakrishnan,"no movement could thrive on a spirit of negation and so asserted the reality of Brahma on the basis of Sruti. Thus in propounding his system, he kept to the ancient tradition and incorporated with it the phenomenalism (Māya) of Buddhism." (*Indian Philosophy*, Vol. II, p. 473).

And the learned doctor, further, testifies that "Gaudapāda was familiar with the Buddhistic doctrines which he accepted when they were not in conflict with his own *advaita*. His liberal views enabled him to accept doctrines associated with Buddhism and adjust them to the advaita design." (*Ibid.* p. 471).

In his commentary on the *Sankhya-Sutra* I, 22, Vignāna-Bhikshu, a commentator of the 16th century has strongly criticized Śankara's Illusion theory and according to him, there is

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not a single Brahma Sutra in which our bondage is declared to be due to our ignorance. In *Padma Purāna*, Śiva says to Pārvati that the Māyāvada is not supported by the Vedas (मायावादमवैदिकम्) and that the theory of māyā is a false doctrine and is only a disguised form of Buddhism.

मायावादमसच्छास्त्रम् प्रच्छन्नं बौद्धमुच्यते ॥

Śankara's Approach and *Vivārta Vāda*

The different theories of creation of things are expressed beautifully here :

आरम्भवादः कणभक्षपक्षः सकापिलः स्यात्परिणामवादः
संघातवादस्तु भदन्तपक्षः वेदान्तपक्षस्तु विवर्तवादः ॥

सतः असत् जायते इति नैयायिकाः
सतः सत् जायते इति कापिलाः ॥
असतः असत् जायते इति बौद्धाः
सतः असत् विवर्तते इति वेदान्तिनः ॥

As opposed to the आरम्भवाद of the वैशेषिका 's, or the परिणामवाद of the सांख्या's, the vedanta school of Śankara follows विवर्तवाद in propounding the theory of creation.

According to Śankara, māyā is the Power of the Lord. It is beginningless and composed of the three gunas - *sattva*, *rajas* and *tamas*. It is intangible, but all the same, it can be inferred from the effects it produces. In the seed stage of the universe, the three gunas are in a state of equilibrium, and

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māyā remains in association with Brahman. When suddenly by the will of the lord एकोऽहं बहु स्याम 'I am one, let me be many'-this equipoise is disturbed, the three gunas are active and assert themselves and thereby give rise to the tangible universe.

There are two kinds of effects in the tangible universe, by which Māyā is inferred. They are the आवरणशक्ति, Power of Concealment and विक्षेपशक्तिः Power of Projection. The former conceals the true nature of Brahman, just as a man hides the sun with his hand. Neither does the sun lose its effulgence by this apparent concealment (आवरण) nor does Brahman lose His Existence - Knowledge-Bliss Consciousness, by the concealment of māyā. But this concealment creates confusion, just as a rope, in darkness, is taken for a snake. So, in the concealment created by māyā, the Ātmā experiences the notions of a doer, and is subjected to the duality of pain and pleasure and fantastic dreams, as in sleep, which, then, appear to him to be real.

स एव मायापरिमोहितात्मा शरीरमास्थाय करोति सर्वं ।
स्त्रियान्नपानादि विचित्रभोगैः स एव जाग्रत परितृप्तिमेति ॥
स्वप्ने सजीवः सुखदुखभोक्ता स्वमायया कल्पितविश्वलोके ।
सुषुप्तिकाले सकले विलीने तमोऽभिभूतः सुखरुपमेति ॥

The आवरणशक्ति and the विक्षेपशक्ति of maya

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work together. Ignorance conceals the real nature of the rope but the projecting power, creates, simultaneously, an illusion of a snake and thus the whole universe, which is only an illusion, appears real; with all the names and forms.

The vedāntists of the school of Śankara take this projection in two aspects समष्टि (collective) and व्यष्टि (individual). In the former, Brahman appears as Iśvara, Personal God and in the latter, the Ātman appears as *jeeva*-embodied soul. Māyā in both the cases becomes an upādhi-or limiting adjunct. Iśvara is not Brahman. Brahman has no attributes. It is Iśvara, the Saguna Brahman, who has attributes of Sat-Cit-Ānanda and becomes the creator, preserver and destroyer of the universe, with the help of the three gunas. He gets light from Brahman. Māyā becomes the material cause of creation and looked at from the angle of Māyā, Brahman is the material cause of the universe as well as the efficient. The spider is the efficient cause of the web, when we look at it as a conscious entity but from the point of view of silk, it is a material cause also, and therefore, there is no need of any material cause from outside. The vedāntists hold that Brahman Himself,

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becomes the universe, through māyā. This is called the vivarta-vāda (विवर्तवाद). Commenting on this theory of Transformation (विवर्तवाद), Dr. Radhakrishnan writes: "If we say that God is transformed into the world, the question arises whether it is the whole of God that is transformed or only a part. If it is the whole, then there is no God beyond the universe and we lapse into the lower pantheism. If it is only a part, then it means that God is capable of being partitioned. We cannot keep one part of God above and another part below."

(*Hindu View of Life, p. 67*)

Aurobindo Ghosh, the Vedic Seer and Māyā-Vāda

The illusionism of Śankara has been, categorically, rejected by Sri Aurobindo, the great vedic savant and seer, as basically untrue to the vedānta and a mere escape from the reality and seriousness of existence. He observes, "But for the Illusionist, the individual soul is an illusion, and non-existent except in the inexplicable mystery of Māyā Therefore, we arrive at the escape of an illusory non-existent soul from an illusory non-existent bondage, in illusory non-existent world as the supreme good which that non-existent soul has to pursue. For this is the last word

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of the knowledge, 'There is none bound, none freed, none seeking to be free." Vidyā turns out to be as much a part of the phenomenal as Avidyā. Maya meets us even in our escape and laughs at the triumphant logic, which seemed to cut the knot of her mystery." (*Life Divine*, p. 39).

According to him, in the entire process of an evolutionary manifestation, "there would be no need to bring in the *fiat* of an arbitrary omnipotence or a cosmic illusion, a phantasy of meaningless maya,....." (*ibid*, p. 376).

In the philosophy of the māyā vādin, this cosmic illusion is a dream that takes place in the Infinite, but Sri Aurobindo, conclusively, affirms, "It is difficult for the positive physical mind to admit the idea, that ourselves, the world and life, the sole thing to which our consciousness bears positive witness, are inexistent, a cheat imposed on us by that consciousness. Certain analogies are brought forward, the analogies especially of dream and hallucination, in order to show that it is possible for the experiences of the consciousness to seem to it real and yet prove to be without any basis or without a sufficient basis in reality. (*Ibid*; p. 377).

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CHAPTER V
THE BASIS OF AVATĀRA-VĀDA IN THE VEDAS

In a famous declaration in the *Bhagavad-gita* IV, 8, Lord Krishna tells Arjuna that 'whenever there is a languishing of dharma and upheavel of adharma, I body myself forth for shielding the good and destroying the evil-doers. And for getting the dharma firmly afoot, I incarnate myself age after age'." The sanskrit text goes thus :

यदा यदा हि धर्मस्य ग्लानिर्भवति भारत
अभ्युत्थानमधर्मस्य तदात्मानं सृजाम्यहम् ।
परित्राणाय साधूनां विनाशाय च दुष्कृताम्
धर्मसंस्थापनार्थाय संभवामि युगे युगे ॥

So, a long list of ten avatārās in the Pauranic literature is available,—the Lord, incarnating, as Fish, Tortoise, Boar, Man-Lion, Dwarf, Parśurāma, Rāma, Krishna, Buddha and Kalki. It is not known who drew this list confining God's incarnation to ten and on what universal authority was that selection proclaimed in the exoteric literature of the Hindus ? And then all these avatāras are of Viśnu and of no other deity. And they are mostly Kshatryias only two incarnations are Brahmana by caste,

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none is Vaishya, nor is any one of the Ṡudra community, although out of that cosmic sacrifice all the four divisions of the society, Brahmana, Kshatryia, Vaishya and Ṡudra were born. (*Rigveda* X, 90, 12).

Does God, the controller of a hundred thousand million galaxies enter the human womb ? Obviously the scientist gets baffled. And then these incarnations started very recently, in human history, "for the protection of the good and destruction of the evil doers." As Dr. Martin Davidson D.Sc. puts it, "Another great difficulty arises when we consider the object of the Incarnation. Its purpose was to make certain that the new nature should not also fall and be shattered. But the Incarnation was an event comparatively late in the history of human family.....so that we might infer that for less than 2000 years has *Homo Sapiene* been assured that he will not suffer a fall and be shattered ? Was this assurance denied to the people of some of the old civilizations and did any of them suffer from a. shattering effect ?" (*The Stars and the Mind*)

From the vedic standpoint, there is only one chapter in the *Yajurveda* which is relied upon as a nucleus of *Avatāra-Vāda.* It states that "in the womb moves Prajāpati, he ever

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becomes born, in sundry figures. The wise discern the womb from which he springeth. In him alone stand all existing creatures." (Griffith's translation.) The text runs thus :

प्रजापतिश्चरति गर्भे ऽन्तः
अजायमानो बहुधा विजायते ।
तस्य योनिं परि पश्यन्ति धीराः
तस्मिन्ह तस्थुर्भुवनानि विश्वा ॥

(*Yajur Veda, XXXI, 19*)

Let us examine the correct interpretation of this mantra. In the context of what *Yajurveda, XL*, 8, says about God as अकायं bodiless, as अव्रणम् , woundless and अस्नाविरं as sinewless, there can be no descent of God in the human womb. The *Yajurveda, XL*, 8, goes thus :

स पर्यगाच्छुक्रमकायमव्रणमस्नाविरꣳ::
शुद्धमपापविद्धम्। कविर्मनीषी परिभूः स्वयम्भूः
याथातथ्यतो ऽर्थान् व्यदधाच्छाश्वतीभ्यः समाभ्यः ॥

The word गर्भ in *Yajurveda, XXXI,* 19 has not been correctly interpreted ; and the contradiction will be avoided if we take the view that "God who is unborn, manifests Himself in the innermost recesses (गर्भं) of Nature,"

Is Avatāra a Phase of Descent or Ascent ?

Derived from the root √तृ with prefix अव, the word *Avatāra* denotes descent – descent, of Iśvara to man or animal. What is or is not

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actually the nature of this Descent ? Dr. Annie Besant clarifies this beautifully : God or Logos, which is a Greek name for Iśvara does not descend but "permeates man with a portion of His own influence, His own power, His own Knowledge, and sends him forth into the world as a superhuman manifestation of Himself" (*Avatāras*.

The man is there, though the power that is acting is the manifested God. Therefore, "the manifestation will be coloured by the special characteristics of the one over whom this over-shadowing is made, and you will be able to trace, in the thoughts of this inspired teacher, the characteristics of the race, of the individual, of the form of knowledge which belong to that man in the incarnation." (*Ibid*)

The *Bhagavad-Gita* similarly declares : "Whatsoever entity of outstanding essence, grandeur, or possessed of high spirit, there be, each such know, thou, to be born from a phase of my Radiant Potence."

यद्यद्विभूतिमत्सत्त्वं श्रीमदूर्जितमेव वा
तत्तदेवावगच्छ त्वं मम तेजोंऽशसंभवम् ॥

(*Bhagavad-Gita X, 41*)

There is another way of looking at the problem of avatāras. There is an ascent of man to superman (by efforts and persever-

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ance) to the status of deities, like Mahādeva Viṣṇu, or Brahmā, which are instances of man's climbing upward the vast ladder of evolution until at last, thus climbing, they, as Dr. Annie Besant vividly puts it "cast off not only all the limits of the separated ego, not only burst asunder the limitations of the separated self, but entered Iṣvara Himself, expanded, becoming one in knowledge, as they had ever been one in essence, with that eternal life from which originally they come forth, living in that life, centres without circumferences, living centres, one with the Supreme." (*Avatarās*, p. 11).

The Yoga Vāsistha which refers to such a theory of ascent is quoted hereunder for reference.

पौरुषेणैव यत्नेन सहसाम्भोरुहास्पदम्
कश्चिदेव चिदुल्लासो ब्रह्मतामधितिष्ठति ।
सारेण पुरुषार्थेन स्वेनैव गरुडध्वजः
कश्चिदेव पुमानेव पुरुषोत्तमतां गतः ।
पौरुषेणैव यत्नेन ललनावलिता कृतिः
शरीरी कश्चिदेवेह गतश्चन्द्रार्धचूडताम् ॥

(*Yoga-Vāsishtha*, II, 4, 14)

The Three Feet of Viṣnu, *Rigveda* I, 22, 17,

In the Dwarf incarnation of Viṣnu, there is the story of dwarf asking for three feet of space, from Bāli. Some scholars are inclined to connect this story with *Rig, I, 22, 17* in the

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text of which, the three steps of Viṣnu are mentioned. The text runs thus :

इदं विष्णुर्विचक्रमे त्रेधा निदधे पदम् ।
समूढमस्य पांसुरे ॥

(*Rigveda, I, 22, 17*)

"Through all this world strode Visnu, thrice His feet He planted, and the whole, was gathered in His footsteps' dust."

There is another text of the *Rigveda* which refers to the three feet of Viṣnu.

यस्य त्रीपूर्णा मधुना,
पदान्यक्षीयमाणा स्वधया मदन्ति ।
यउ त्रिधातु पृथिवीमुत द्यामेको
दाधार भुवनानि विश्वा ॥

(*Rigveda I, 154*, 4)

"Viṣnu whose three places are filled with sweetness, imperishable joy as it may list them, who verily alone upholds the three-fold, the earth, the heaven and all living creatures." (Griffith)

The followers of the bhakti cult have, vainly, sought a confirmation of their view on Vāmana-avatāra, in these mantras. In fact the word Visnu and His three feet refer to time. As Śatapatha Brāhmana affirms, what is Viṣnu? कालो वै विष्णुः Viṣnu is time, and His three feet are Past, Present and Future. Viṣnu is also sacrifice यज्ञो वै विष्णुः and in that

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context, His three feet are the three priests. Viṣnu is all-pervading God, and in that light, His three steps are the earth, the heaven and all intermediate regions.

The Allegory of Avatāras.

All the ten avatārās which we find referred to, in the post-vedic literature are different stages in the process of evolution. They are landmarks on the road to evolution and civilization. Dr. Annie Besant, thus, observes in this connection: "Just as the *Fish* had typified the Silwrian epoch, just as the *Tortoise* had started on its way, the great amphibian evolution, so did the *Boar*, that typical mammal, start the mammalian evolution". (*Avataras*, p. 86). And further she says, "In *Prahlada* is typified the dawning spirituality, which is to show in the higher race of Daityas as they pass on into definite human evolution.....and then the *Dwarf*? Yes, for man was as yet dwarf in the truly human nature, although vast in outer appearance." (*Ibid*, p. 90.)

There is another allegory given by a vedic scholar. Pt. Buddha Deva Vedālankāra, in an article, '*The Gods That Hindus Worship*'. basing his views on Śatapatha Brahmana (XI, 1, 5) which is the source of the Paurānic story of the Dwarf In-carnation of Visnu

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observes :

"Thus these first five avatāras represent five classes of people :-

(1) Skilled labour (the *fish*)

(2) Class of brain of people devoted to the disinterested pursuit of knowledge (the *tortoise*)

(3) The statesman (*varāha*)

(4) Great leaders of mass revolutian (*Nrisimha*)

(5) Patient and steady groups that gradually rise to power on account of their spirit of self-sacrifice and unselfishness, a (*Vāmana.*) (*Vedic Digest*, p. 349, October, 1957).

In a small treatise like this, we need not enter into the details of these conclusions.

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Book V

The Science of the Planets

(or The Bases of Astrology in the Vedas)

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PREFACE

No apology is, perhaps, needed for bringing out this small treatise, viz.,'The Bases of Astrology in the Vedas', which is the one in the series of other pamphlets on Vedic Interpretation by the author.

The eternal wisdom of the Vedas has to be brought home to the general reader who has no easy access to this hidden lore. To meet objections, to dispel doubts and to carry conviction is the warp and woof of this presentation, —, to carry conviction that the Vedas or their commentaries in the Brāhmaṇas are not 'arid deserts of puerile speculation,' as the author of the *Vedic Age* observes, but they present a repository of knowledge in a nucleus form, opening out the wealth of wisdom in all branches of Art, Science and Philosophy. In the words of Max Muller, "Whatever the Vedas may be called, they are to us unique and priceless guides in opening before our eyes, tombs of thought richer in relics than the royal tombs of Egypt and more ancient and primitive in thought than the oldest hymns of Babylonian or Accadian poets." (*Six Systems of Indian Philosophy*, p. 44)

Like the many viands at a feast, where

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each appetite may be satisfied, these treatises make a critical and impartial approach, with all sublime simplicity which the subject deserves, to the many problems which can be studied in the Vedas.

The scepticism and the cynical negation of some of the oriental scholars of the West, who have considered the Vedic invocations as the cry of a primitive race, has been an ever-lasting challenge to the Indian mind—more so in an India of post-independent era, where revival of the old Vedic polity and sagacity has all the more become necessary.

The present treatise on astrology has been divided into five chapters, dealing with the History, Development and Popularity of Astrology, the Nine planets, the Twelve signs and the Nakshatras. A brief chapter has been added on the Copernican Theory.

No attempt has been made to enter into the descriptive working of astrology as practised by the professionals, because there is no reference to any offshoot of Astrology, say, Horary, Mundane, Astro-Palmistry etc., etc. in the Vedas.

As Martin Davidson, D.Sc., observes, "There is no planetary Astrology suggested in the Atharva-veda, although a list of 28 Nakshatras

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(each Nakshatra being a small cluster of stars which lay in the path of the moon) is mentioned. It is thought that planetary worship may be a foreign importation, perhaps of Magian origin." (*The Stars and the Mind*).

Nor have we taken up the remedial aspect, because, whatever remedies or psychotherapeutical hints are observable in the Atharvaveda, they have no bearing on the 'planets' as such. We have, therefore, left that aspect to be dealt with in another series, 'Medicine in the Vedas.'

The subject matter dealt herein strictly adheres to the references available in the Samhitā texts and the popular notions which have been developed into the working of Astrology,with all its complicated professionalism in the Nādi Granthas, Rāvaṇa or Aruṇa Samhitās, etc., and the supernormal cognition in predictive astrology, which fall outside the Samhitā text, have not been touched in these pages.

The Nādi Granthas provide a ticklish problem. There is much of professional quackery in the name of the Nādi Granthas and the so called Samhitās, connected with Rāvaṇa Aruṇa, Bhrigu etc. There is a class of people in India, who have developed some slight Extra

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Sensory Perception, which a student of para—psychology readily understands, and practising in the name of Astrology, are capable of giving most accurate predictions of the past and thereby creating a miraculous faith in their clients. But they fail miserably in their predictions about the future. They are illiterate, even born blind, but profess to read the palm and the horoscope and have a roaring trade. The less said of these people, the better. Even the intelligent and perceptive visitors fall a prey to their machination.

The *Theosophist* of Adyar, in its May 1885 issue, records an incident in which Colonel Olcott, the founder President of the Theosophical Society had met a quack Brahmin astrologer who had answered his questions, pretending to read from the pages of the works of the great Bheem Kavi.

The intelligent student of Astrology, though bewildered, cannot be oblivious of the fact, that there are serious limitations on the predictive side of Astrology. And he knows Ptolemy's dictum, viz., "Judgment must be regulated by thyself as well as by the Science. For it is not possible that particular form of events should be declared by any person, however, scientific, since the understanding

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conceives only a certain general idea of some sensible event and not its particular form.

It is, therefore, necessary for him who practises herein, to adopt inference. They only who are inspired by the Deity can predict particulars."

It is, no doubt, outside the range of astrological calculation, to predict particulars, but how are we going to reconcile ourselves to the prefessionalism of the so-called astrologers who are capable of creating an illusion, by making startling predictions in particular terms.

It is beyond the scope of this small treatise to go deep into the psychological workings or the trade-secrets of such astrologer-popes. It is enough for us to be cautioned and guided by the view of the late Professor Surya Narain Row, M. R. A. S. the most shrewd analyst and a prolific Indian writer on Astrology. He observes, "There are some cheats who predict most faithfully the past, but fail most miserably in their future predictions. Such men are generally very successful in some places, and carry away large sums of money. This must be put a stop to.

"In India, there is a species of knowledge known as the Pysachika (पैशाचिक) Vidyā or Com-

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munication with Devils. There are certain hateful methods, it seems, by the practising of which, a man suddenly finds himself in possession of information about the past history of individuals, the revealing of which gives him a great advantage with the ordinary people at the start. Generally, he is poor and ignorant and pretends to read the past from books which are given various inviting names. Some of these are called Nadies, such as Sukra Nadi, Kuja Nadi, Guru Nadi etc. I have seen many of them and I refer the readers to my contributions in the Astrological Magazine Vol. XI, for fuller information. These processes are also given other names such as Karnapisacha, Oochista Ganapathi, Bhethala, and so forth. They possess some power by which, they can correctly read the events of a man's past life but which prove useless, when they refer to the future." (*An Introduction to the Study of Astrology in the Light of Modern and Physical Sciences*, 7th Edition, 1926, pp. 47-48).

A word about the Copernican (1543) theory will not be out of place here. As Bertrand Russell puts it, "Science as a factor in human life is exceedingly recent and as an important force begins with Galileo (1564-1642). Scientific method, as is now understood and practised

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came into the world full fledged with Galileo and to a somewhat lesser degree in his contemporary Kepler (1571-1630). It was Kepler and Galileo who established the fact that the earth and the other planets go round the Sun. This had been asserted by Copernicus but was known already to certain Greeks but they had not succeeded in giving proofs." (*The Scientific Outlook*, p. 23).

Archimedes, writing to King Gelon of Syracuse says : "Aristarchus of Samos brought out a book consisting of some hypotheses of which the premises lead to the conclusion that the Universe is many times greater than that now so called. His hypotheses are that the fixed stars and the Sun remain unmoved, that the earth revolves about the Sun in the circumference of a circle, the Sun lying in the centre of the orbit."

Citing this letter, Bertrand Russell concludes, " I doubt whether Copernicus would ever become Copernicus but for Aristarchus whose opinion had been forgotton until the revival of classical learning." (*Ibid.*, p. 19).

Russell probably does not seem to be aware of the fact that the Indian seers had a knowledge of this theory long before it could have become known to the Greeks. The particular

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reference to a hymn of the Yajurveda, (III, 6) dealt with, in the concluding chapter of this treatise, will make the position clear to the inquisitive mind.

There is a huge field of Vedic literature which still remains unexplored, with sanctity and significance, deserving the attention of ardent scholars and it is hoped that this treatise will not only prove valuable, informative and instructive to the general reader but also be a source of inspiration to the enthusiastic research scholar in his pursuit of higher knowledge.

Buddha Purṇimā
22nd May, 1959.

Dharma Deva Mehta

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CHAPTER I

HISTORY, DEVELOPMENT AND POPULARITY OF ASTROLOGY

There are few subjects which have received more attention and popularity but advanced less than Astrology. It is a subject to which there is an equal claim both of the metaphysician and the mathematician, but while metaphysicians have dealt with this subject, without regard to psychological findings, the mathematicians have evolved such notions as have been thrust upon them by the Physicists with all the limitations of the laboratory. And the result has been that their conception of this subject has become almost topsyturvy in recent years.

The germ of astrology lies in the zodiac, and it is not known, exactly, when the zodiac was first conceived or when the names given to the various signs of the zodiac were first brought into effect. To begin with the history of Western astrology, some of the authorities give credit to the Babylonians for this invention in 2000 B. C. Others trace it as far back as 4000 B. C. from Egypt. The Chaldeans

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claimed, as Sir J. G. Fraser holds, that the secrets of astrology were revealed to them by their God Oanes, who had a human form down to the waist and had fish-like tail. Fraser says that, though, according to Pliny and Cicero, the date of this revelation was somewhere between 10,000 and 15,000 years ago, the oldest surviving records of astrological observations are not quite so romantically remote. He records that somewhere about 4050 B.C., Sargon, King of Agada, made such records on 70 clay tablets. A reference is also made to the Chaldean poem of Isduhar written on 12 tablets and concerned with the signs of the zodiac.

Prof. Forbes of the London University, in his book, *History of Astronomy*, refers to a clay tablet in the British Museum dating 2,000 B. C. which records a solar eclipse and has served to render the lunar theory more accurate than was possible by the finest modern observations.

Prof. Forbes adds that fragments of a library at Agada (Chaldea) have been preserved at Nineveh, from which we learn, that the star charts were even then divided into constellations which were known by the names which they bear to this day, and that the signs

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of the zodiac were used for determining the courses of the Sun and Moon and of the five planets viz., Mars, Mercury, Venus, Jupiter and Saturn.

In India, according to the popular view, astrology is as old as the Vedas but as Dr. Rele observes in his book, *Directional Astrology of the Hindus*, (p. 1), 'the whole of the Jyotish Śāstra, then, consisted of observing the movements of the sun, the moon, their passage through the constellations, (a mention of which is found in the *Atharva-veda*) and assigning a certain significance to them, and was then made more applicable to Mundane astrology than to a Judicial one.'

No mention is made of the names of the signs of the zodiac in the *Atharva-veda* but as Dr. Rele avers, it must not be supposed, that the division of the zodiac into twelve parts was not known to the Hindus in those times, but the twelve parts were then known by different names. He is of the view that as time went on, owing to the invasions of the Mohammedans and the Greeks and their association with the Indian people, their science got mixed up with ours and the present Hindu system of astrology, as it is studied and practised, is a combination of Chaldean, Grecian and

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Egyptian astrology. *(Ibid*, p. 1*)*.

The Hindu word *Jyotish*, is derived from द्युति: *dyuti-jyoti*, meaning, light, and the Hindu Jyotish Śāstra, therefore, was believed not as the science of stars, but as the science of light.

In the Upanishadic period, we find in a dialogue between Nārada and Sanat-kumāra in *Chhāndogya Upanishad*, (VII, 1), that the science of Nakshatras, and the Rāśis was quite popular.

The oldest horoscope believed to be in existence, is that of Rāma Chandra, the hero of the *Rāmāyaṇa*, who was an actual, and not, as some people think, a mythical character.

As Reid points out, "In the Ramayana, the planetary positions, as they are said to have been at the time of his birth, are given in detail. This constitutes the first personal horoscope in existence and establishes the fact that the person for whom it was made was born at some time prior to 3102 B.C., probably somewhere about 5000 B. C." *(Towards Aquarius* p. 33*)*.

Greek Influence and Hindu Astrology

The question of mutual influence and indebtedness of the Greek and Indian systems of astrology is debatable among

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scholars, but Greek contribution to Indian astrology cannot be denied and it is prominent since the time of Varāhamihira. Varāhamihira in his *Brihat-Jātaka*, a work on astrology, while admiring Greek astrology, gives the following quotation of *Garga*, a Hindu astrologer:—

म्लेच्छा हि यवनास्तेषु सम्यक् शास्त्रमिदं स्थितम् ।
ऋषिवत्तेऽपि पूज्यन्ते, किं पुनर्दैवविद् द्विजः ।।

"The Greeks are Mlecchas, and this knowledge of astrology is well established among them. They are also honoured as seers, then how much more an astrologer who is a Brahmin, should be honoured."

A critical survey of ancient Indian literature will readily convince us, that even before the Greek influence, astrological problems were minutely studied by the Indian sages. As Mrs. Leo in her essays, *Rays of Truth*, corroborates it, "The oldest religion of which we have any cognizance is the Hindu religion and this appears to have been the cradle and nursery of astrology and that the caste system of ancient India seems to have been arranged upon a basis which finds support and justification in astrological teaching."

The Hellenized astrology is presented to us in *Yavana-Jātaka* and other treatises. The brilliant Indian writers, Varāhamihira and

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Kalyāṇa Varmā thoroughly Indianized it and in the laconic and graceful style, they not only retained the topics of Ādhāna, Āyur-dāya Daśā, influence of Rāhu-Ketu etc. which were discarded by the Greek writers, but also included in their treatises brilliant expositions of the Greek astrology viz., Sadavarga, Raśmi, Ashṭakavarga, Strījātaka, Nashṭajātaka and the like.

Madame Blavatsky in her *Secret Doctrine, (Vol I*, p. 710 et. seq.*)*, has refuted the opinion sponsored by Professor Weber (and later accepted by some German, English and American orientalists) that "the peoples of India had no idea of the knowledge of the zodiac, prior to the Macedonian invasion and that it is from the Greeks that the ancient Hindus imported it into their country."

According to Madame Blavatsky, the *Book of Job*, which preceded Homer by at least one thousand years and is the oldest in the Hebrew canon, speaks of the making of "Orion,.....of Scorpio and the twelve signs" (XXXVIII,31,32) and if the zodiac was known in the days of Job, how could civilized and philosophical Hindus remain ignorant of it." (*Ibid*, p. 710). Madame Blavatsky goes on to observe, "Taking as starting point, several

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astronomical references in the *Book of Job*, Bailley has proved, that the earliest founders of the science of the zodiac belonged to an anti-diluvian primitive people of 3700 years B. C. Even accepting this date, for the sake of argument, it is proved beyond doubt, that it was not the Greeks who invented the zodiac, for the simple reason, that they did not exist as a nation thirty-seven centuries B.C.—at any rate not as a historical race admitted by the critics." (*Ibid*, p. 711).

According to Sepharial, a great Western authority on astrology, the zodiac was known to India long before the Greeks came to know of it. He writes in his book, *The New Manual of Astrology*, (Book IV, p. 209), "Ever since the days of Ptolemy, the writer of the *Tetrabiblos*, the dignities of the planets have been received by Western astrologers, exactly, as given by him in that famous work. But there is every reason to believe that Ptolemy received his initial instruction in the celestial science from one of the Alexandrian teachers, and that, primarily, the teaching was derived from India. At all events, it is well known that the science had attained considerable excellence in that country many centuries prior to the time of Ptolemy."

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Popularity of Astrology

Authentic evidence shows that Chinese Emperors were chosen according to their skill in astronomy. Cheuni was elected in 2513 B.C. in this manner.

"The ancient Chaldeans were masters of astrology in its golden age and their work and prowess has never been excelled or even equalled, and though they used the natural positions of the stars and planets as revealed to them by direct observation, they perceived relationship and cycles and predicted eclipses which amaze our minds at the present day." (*The Principles, Theory and Practice of Scientific Predictions*, William J. Tucker, p. 18).

The noted Egyptian Ptolemy (about 150 A. D.) blended astrology with his great work on astronomy and from this time onwards, books on astrology based mainly on the beliefs of Babylonians and Egyptians began to multiply and spread from the Mediterranean basis to Europe. They appeared in various languages, particularly Arabic, right down to the middle ages, when astrology, in common with other arts of divination became extraordinarily active and popular in European countries.

In Shakespeare's *Julius Caesar* we read

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how the Romans swore by astrology. Spurinna was the name of the astrologer who warned Caesar to beware of the Ides of March, for, on that day, he would be in danger, but if he took care of himself, he would be well. On March 15, Caesar decided that he would not leave the house but on the persuasion of Brutus, he was induced to go to the Senate, on the way to which, he again met the astrologer.

"Well," said Caesar to him, "The Ides of March are here and nothing has happened to me. You see, your prediction is false." "True," replied Spurinna, "the day has arrived, but it is not over yet." Within a few hours, Caesar had received his mortal blow from the hand of the most trusted friend.

Fifteen years before the great plague of London, we have all read about it in the history books, the event was predicted by William Lilly, a famous astrologer of the time.

Gjamas was a renowned astrologer in the court of the King of Persia and foretold the advent of the Messiah and the birth of the Prophet Mohammed. As J. Ross Tyler, an American astrologer testifies, "In the early years of this century, Sepharial predicted the Great War I and advised his clients to clear

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out of Government securities and invest in colonial stocks." Before the Spanish Armada, Michael Nastrodamus, the greatest of astrological Kabalists, predicted that England would rise to greatness through an alliance of the British throne with Philip II of Spain and thereafter Spanish influence in Europe would proportionately decline.

Plato, Aristotle, Pythagoras studied astrology and Hippocrates, the father of medicine, said, "The man who is ignorant of the science of astrology deserves to be called a fool, rather than a Physician."

Cheiro, the well known palmist has been a great astrologer and it is curious to note, that his book, *World Predictions*, about the year 1927, makes startling predictions which have been justified. For instance, about India getting independence, he writes at p. 160, "England will be attacked in all her Mohammedan possessions, she will rend that country from end to end, until it becomes equally divided between the Mohammedans and the followers of Buddha and Brahma."

Surely no one ever dreamt of this in 1927.

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CHAPTER II

THE NINE PLANETS AND THEIR INFLUENCE ON HUMAN DESTINY

Planetary Symbolism and Vedic References

(i) .....शन्नो दिविचरा ग्रहाः (*Atharv.* XIX, 9, 7)
"May the planets in heaven be kind to us !....."

(ii) शतं श्वेतास उक्षणो दिवि तारो न रोचन्ते । मह्ना दिवं न तस्तभुः । (*Rig.* VIII, 55, 2)
"A hundred oxen white of hue are shining like the stars in heaven. So grand, they seem to prop the sky."

Moon's Phases

(i) नवो नवो भवति जायमानो अह्नां केतुरुषसामेत्यग्रम् ॥
भागं देवेभ्यो वि दधात्यांयन्प्र चन्द्रमास्तिरते दीर्घमायुः ॥
(*Rig.* X, 85, 19)

(ii) About these phases of the Moon, we also read in the *Yajur-veda*, XVIII, 40 :—
सुषुम्णः सूर्यरश्मिश्चन्द्रमा गन्धर्वस्तस्य.....

Stability of the Planets

(i) सत्येनोत्तभिता भूमिः । सूर्येणोत्तभिता द्यौः ॥
ऋतेनादित्यास्तिष्ठन्ति । दिवि सोमो अधिश्रितः ॥
सोमेनादित्या बलिनः । सोमेन पृथिवी मही ॥
अथो नक्षत्राणामेषाम् । उपस्थे सोम आहितः ॥
(*Rig.* X, 85, 1-2)

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"Earth is upheld by truth, heaven is upheld by the Sun, the ādityās are supported by sacrifice. Soma is supreme in heaven. By Soma, the ādityās are strong; by Soma the earth is great, Soma is stationed in the vicinity of these Nakshatras." (Wilson). 'Soma' here implies 'gravitation.'

The Nine Planets

"दिविचरा ग्रहा:" (*Atharv.* XIX, 9, 7)

According to Sepharial, "Astrology considers the Sun and Moon as planets in respect of their functions, when taken in relation to the Earth as a centre of action, inasmuch as in regard to ourselves, they are agents of the sidereal influence, quite apart from their generic status in intracosmic life." (*A Manual of Astrology*, p. 9). It is believed that the planets are the vehicles of the great spirits, who minister to His will. Each planetary spirit represents a sound and a colour, a definite sphere of influence and is concerned with a separate line of evolution, over which the mighty angel presides. Under this belief, every human being belongs to one of these primary rays, some being on the line of power, others of love, others again on the line of wisdom and so on.

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Hindu astrology recognises the following nine planets :—

English Names	*Indian Names*
Sun	Ravi
Moon	Chandra
Mercury	Budha
Venus	Śukra
Mars	Kuja
Jupiter	Guru
Sàturn	Śani
Dragon's Head	Rāhu
Dragon's Tail	Ketu.

Rāhu and Ketu are the two fictitious planets and are, in reality, the nodes of the Moon's path. We know that the Moon does not move exactly in the ecliptic but moves in a circle slightly inclined to it. The points where this path cuts the ecliptic are called nodes. The ascending node is called Rāhu and the descending node, Ketu. It is for this reason that these two planets are taken as 180° apart, being opposite to each other.

According to a Paurāṇic legend, Rāhu is the head and Ketu, the body of the demon who joined the gods deceitfully, when *amrita* was being distributed. He was easily discovered, when the nectar was given to him, with the result, that his head was cut off by

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Lord Vishṇu, but as the nectar had reached as far as the throat, he could not die.

As his entrance into the circle of the *devatās* was due to the lack of vigilance on the part of the Sun and the Moon, who were stationed on duty, they were granted the power to eclipse the Sun and the Moon, when they were at a node during the full and new moons.

In Western astrology, these nodes are called the head and the tail of the Dragon and are taken by many astrologers to be Uranus and Neptune, but as Dr. Bh. Satyanarayan Rao in his book, *A Text Book of Scientific Astrology*, observes, "The notion of some people that these are equivalent terms for the planets Uranus and Neptune is entirely erroneous."

Orbits and distances of planets from the Sun

The following table gives the distance of planets from the Sun :—

Planet	*Distance in millions of miles*
Mercury	35
Venus	67
Earth	93
Mars	142
Jupiter	483
Saturn	886

It will be apparent that Mercury receives

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more light from the Sun than the Earth or even Venus, which receives as much as twice the amount falling on our insignificant globe. This may be the reason, why Mercury, Buddhi or wisdom planet is more occult and mysterious than Venus.

Planetary Nature and Indications

The following is the nature of the influences of the various planets in their psychological and physical reactions, and comparatively understood, they are known by the following significant appellations :—

Sun	the cosmic Father
Moon	the cosmic Mother
Mercury	the Messenger of gods
Mars	the Engineer
Jupiter	the great Benefic
Saturn	the Teacher

Planetary Relationship

By the term, friendship and enemity among planets, we have to understand that "the rays of one planet will be intensified or counteracted by those of the other declared to be its friend or enemy respectively." (*Hindu Predictive Astrology*, B. V. Raman, p. 41). From a philosophical standpoint, when we talk of Mercury as enemy of Mars, we simply mean, that it is the "Reasoning faculty of Man"

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represented by Mercury, that curbs the "Youthful Passion" which Mars represents.

Mars has its exaltation in the sign of Saturn viz., Capricorn. Saturn is a planet of chastity and with a mind full of chastity, equanimity, and truthfulness, the prowess of Mars gets brilliant and the evil propensities of Mars, under the chastity of Capricorn, vanish away.

The following table will indicate the relationship of planets recoginsed in astrology:—

Planets	*Friends*	*Enemies*	*Neutrals*
Sun	Moon Mars Jupiter	Saturn Venus	Mercury
Moon	Sun Mercury	None	Mars Jupiter Saturn
Mars	Jupiter Moon Sun	Mercury	Venus Saturn Venus
Mercury	Sun Venus	Moon	Mars Saturn
Jupiter	Sun Moon Mars	Mercury Venus	Jupiter Saturn

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Venus	Mercury	Moon	Mars
	Saturn	Sun	Jupiter
Saturn	Venus	Mars	Jupiter
	Mercury	Moon	
		Sun	

How Signs were Allotted to the Planets

How the twelve signs from Aries to Pisces were allotted to the nine planets, is given in an old legend, according to which, when the world was created, the Sun and the Moon, as eyes of the Creator were asked to control the celestial sphere, and indicate the resultants of the good and bad *karma* of the terrestrial phenomena. They were given one sign each viz., Leo, for the Sun and Cancer, for the Moon. Then Mercury, who never wanted to go beyond 23° of the Sun, came up for his share. The Sun gave his next house Virgo to him and Moon gave her next house on her side viz., Gemini to him. So Virgo and Gemini were allotted to Mercury.

Then came Venus, being a little farther and not going beyond 47° from the Sun, and both the Sun and the Moon gave him the next signs available viz., Libra and Taurus. Then Mars got Scorpio and Aries. Jupiter got the fifth allotment viz., Sagittarius and Pisces, and Saturn, the sixth viz., Capricorn and Aquarius.

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Thus, keeping only one sign for themselves, the other ten signs being equidistant on either side, were given to the other planets.

On Invocation to the Planets

The invocation to 'planets' to be kind to man, raises an important question of planetary influence on human fortunes—a question which has baffled even the highly intelligent group of people. The scientist is vehement in his denunciation of any influence exerted by the planets on the day to day working of human destiny. On the other hand, the astrologer, relying on the limitations of science in probing the mysterious, has his own arguments to favour the subtle mysterious influence of these heavenly *grahas.*

Both the cases need consideration. Sir Harold Spencer Jones, F. R. S., in an article, *Our Fate in the Stars*, observes, "No logical reason has ever been given, why distant masses of matter such as the moon, the planets, or the stars can in any way have an effect on human lives. Nor do the astrologers say, why or how, the influence of two particular planets combine to be favourable or unfavourable depending upon their precise positions relative to the earth." And he echoes with all scientists, when he concludes, "The more I investigate

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Astrology, the more I am convinced of the entire lack of any justification for the vast superstructure that has been erected on arbitrary postulates." And one of the most arbitrary postulates is the linking up of human working with these planets, amongst which the three planets, Uranus, Neptune and Pluto create a most anamolous position. "They were discovered," as Sir Jones observes, "in comparatively recent times and these names were assigned to them very shortly after their discovery. Why, for instance, should the planet Neptune be of special importance to seafarers, merely, because the name Neptune happened to be given to it by astronomers—not by astrologers—after its discovery in the year 1846 ?"

And the influence is extended to the funniest extent when auspicious days are specified for purchasing of lottery tickets, for building houses, for beauty treatment and surgical operation etc. etc.

The Boston and Cambridge branch of the American Association of Scientific workers in the United States of America, formed a Committee to investigate astrology and in March 1941 issue of their Scientific monthly, the conclusions are : "It is impossible to under-

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stand, how the stars can affect human affairs, but it is doubly difficult to suggest a mechanism to account for the influence of the zodical signs which continue to change their position among the stars."

"Astrologers have not provided us with as much as a sound hypothesis that might serve as a basis for their speculations. Astrologers attempt to offset this lack of a sound working hypothesis by the introduction of terms and concepts, that are unknown to physicists and astronomers. No one with a high school training in Physics should be fooled into accepting an explanation of the laws of Astrology in which the term 'cosmic vibration' figures prominently."

According to astrologers, William J. Tucker, President of the British Association of Scientific Astrologers, Ltd., London, maintains in his book, *How, What and Why of Astrology*, that, "at the moment of birth, the lines of force of the existing magnetic field surrounding the Earth (product or resultant of the composite magnetic fields belonging to the Sun, Moon, Planets and Stars) run through the child's body setting the paths of the electrons, within the atoms of the matter composing the child's body, into a fixed and

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definite pattern, which appears to exist for the duration of its life."

According to Raphael, there are two ways of approaching this problem, first is "strict observation" and second is "analogous reasoning." By strict observation, we mean, observation of the effects that certain aspects and positions of the planets have upon different individuals born at certain times, for instance, a person born at noon, will be different from a person, born at night or at any other hour of the day, in look, shape, and fortune. Raphael holds that twins or persons born at the same time within the same latitude are not only identical in shape but have other events of life, similar according to the environments in which they are born and unless there be planetary influence "why should two persons born at the same time and place, exhibit similar characteristics, which never happens, unless the time and place are identical." (*The Key to Astrology*, p. 5).

The second way of approaching the problem is by analogous reasoning, in which we find how the Moon is ruling the tides, and how her waxing and waning affects the insane people.

On this, Cheiro, the great palmist—astrologer and numerologist, testifies, "Granted

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that this be admitted, (viz. the effect of the Moon on the brain itself which contains the most subtle essence and is one of the greatest mysteries known in life) what then of the part played on human nature by the rest of the planets which are in each individual case far larger than the Moon ?" (*Book of Numbers*, p. 19).

"The following table, showing the dimensions of each of the planets will illustrate better than any words, I may use this side of the argument :—

Diameter of	Mercury	2000 miles.
,,	Moon	2100 miles.
,,	Venus	7510 miles.
,,	Earth	7913 miles,
,,	Mars	4920 miles.
,,	Jupiter	88390 miles.
,,	Saturn	71900 miles.
,,	Sun	860,000 miles.

I ask, is it logical, with such a demonstration before one, to admit the effect of the Moon and to deny any effect to the other planets that are, in fact, so much larger than it ?" (Ibid, p. 19).

According to B. V. Raman, 'No sane brain could ever deny the influence of planets upon man and how they affect, deter and

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facilitate his future career on the three planes of human existence viz., physical characteristics, mental peculiarities and spiritual aspirations." (*Hindu Predictive Astrology*, p. 25) and further, "Astrology is not a Science like Mathematics, Botany, Zoology, Chemistry or Physics, the study of which requires strict adherence to the worlds' conventionalities of common sense reasoning and ordinary logic. Astrology comprehends something higher, mysterious and subtle." (Ibid, p. 19).

Moreover, the Sanskrit word *graha* is derived from the root √ गृह् to catch, which implies 'something having the power to attract or repel.'

According to Evangeline Adams, a famous American astrologer, "We know from thousands of accurately recorded observations made in the true spirit of science, that certain combinations of planetary influences will produce certain effects. But, neither the chemist nor the astrologer knows, why these things are so, any more than a biologist knows, why a seed grows, when it is planted and watered, or why a puppy grows up to be a dog." (*Astrology for Everyone*, p. 223).

So we arrive at a compromise between the two schools of thought and recognise the empirical basis of astrology. Whether their

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results were deduced with full consciousness or otherwise, of any connection or influence of the planets upon human affairs, the services rendered by the astrologer in the field of observation and deduction cannot be ignored. And we agree with Professor Forbes of the London University, in what, he says in his *History of Astronomy*, "Even if these men were sometimes led to evolve cause and effect, which now seem to us absurd, let us be tolerant and gratefully acknowledge that these astrologers, when they suggested such working hypothesis, were laying foundation of observation and deduction."

In this connection, it is significant to note that the Egyptian zodiac was deduced and constructed, when Capricorn presided over the Summer solstice. The extreme veneration of the Egyptians for animals was the cause of the animal names being given to the zodiac.

The signs counting from Capricorn correspond exactly to the seasons in Egypt. *Makara, Kumbha, and Meena* have reference to water. In Egypt they symbolized the rise of the Nile, the innundation of the Nile and the entire covering of the country by the overflow. Meena shows the indolent habit of the people of this season.

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Mesha (Ram) represents the succeeding season, when the animals could return to their pastures. It is shown by 'ram' as the leader of the troops.

Vrishabha (Bull) represents the 5th month after solstice, when the Egyptians commenced the labours of agriculture and the oxen were attached to the plough.

Mithuna. The prolific soil of Egypt soon was brought forth under the African Sun, hence the two kids.

Karka. When the Sun had arrived at the farthest point of its course, that is, to the winter solstice, it retraced its steps. This retrograde movement was symbolized by the crab.

Simha. In the following month, the corn began to ripe. All nature began to put on her greatest strength. Lion, the strongest animal was the symbol of this month.

Kanyā. The virgin bearing in her hand, an oar of corn, symbolized the reaper's month.

Tulā. The symbol of equality designated the equinox.

Vrishchika. The pestilential wind, which reigned during the following month indicated the venomous scorpion.

Dhanu. The arrow signifies the eastern

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wind, gentle and mild, and northern, prevailing for 5 or 6 weeks, which preceded the return of the Nile innundations.

The Egyptian symbolism of the zodiacal signs is, indeed, a masterpiece of observation and deduction.

To the question, 'Have planets any influence on us?'—the approach of Swāmi Dayānanda, the mighty Vedic savant and reformer of the 19th century, is pertinent and deserves perusal. He,thus observes,in his *Satyārtha Prakāsh*,"Not the kind of influence, the popes tell you about. It is true that the sun and the moon, by their heat and cold, and by their influence on the seasons, are the cause of pleasure and pain to human beings, according as they i.e., heat and cold etc. agree with their nature or not. But the popes deceive you, when they say, 'Hear us, O great banker ! the sun or the moon, by virtue of his or her being in the 8th sign of the Zodiac, is maleficent to you or to her.' The Saturn has chiefly affected your feet, for 2½ years you will suffer, greatly, through it. It will make you leave your home and hearth, wander in foreign lands, but should you give alms, have the sacred hymns chanted, the holy books recited, and their worship performed and thereby propitiate the planets,

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you may escape their wrath and the consequent suffering." (Chapter XI, *Light of Truth*, p. 387, Translation by Dr. C. Bharadwaja).

And further, he, suggestively, asks the astrologer-popes, "If the mantras are under your control, and by their help, you could do anything you liked, why do you not, then, bring gods under your control and make them steal kings' treasures, carry them to your houses, fill your coffers and thereby enable you to live in ease and comfort ? Why are you, then, going about, begging for oil, given in charity by the laity, in order to propitiate Saturn ?" (*Ibid.*, p. 388).

In a simple, honest and perfectly straightforward argument, he, further, explodes the very basis of the astrologers' standpoint. "You say, that the sun and other planets are pleased, when you are given charity in their name and displeased, when no charity is given. Give us some positive proof of their pleasure and displeasure. Let any two persons be made to walk barefooted on the heated ground in June—the hottest month of the year—the feet and body of the one with whom the sun is pleased should not be burnt, while those of the other with whom the sun is displeased should get scorched.

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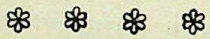
Or let any two persons, with one of whom, the moon is pleased, while angry with the other, be stripped naked and exposed to cold all night on the day of full moon in December—the coldest month of the year. If one of them feels cold and the other not, one could believe that the planets are maleficent, as well as beneficent." *(Ibid.)*.



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CHAPTER III

THE TWELVE SIGNS IN ASTROLOGY

Names and Symbolism of the Signs

Whatever be the nature and background of planetary symbology, Astrology, the science of Stars, derived from the Greek root, *Astron*, meaning 'a star,' hinges round the twelve signs of the Zodiac, a reference to which we find in the *Atharva-veda*, in the following *mantra*:—

द्वादश प्रधयश्चक्रमेकं त्रीणि नभ्यानि क उ तच्चिकेत ।
तत्राहतास्त्रीणि शतानि शङ्कवः षष्टिश्च खीला अविचाचला ये ।।

(*Atharv*. X, 8, 4)

"One is the wheel, the tyres are twelve in number, the naves are three. What man has understood it ? Three hundred spokes have thereupon been hammered and sixty pins set firmly in their places." (Griffith)

These twelve signs have been thus named and symbolised :

Aries	....	Ram	....	मेष
Taurus	....	Bull	....	वृष
Gemini	....	Twins	....	मिथुन
Cancer	....	Crab	....	कर्क
Leo	....	Lion	....	सिंह

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Virgo	....	Virgin	....	कन्या
Libra	....	Balance	....	तुला
Scorpio	....	Scorpion	....	वृश्चिक
Sagittarius	....	Archer	....	धनुः
Capricorn	....	Goat	....	मकर
Aquarius	....	Waterman		कुम्भ
Pisces	....	Fishes	....	मीन

These twelve signs, like the twelve tyres of the Wheel of Time, were regarded as glyphs of a universal language, common to seekers of truth, irrespective of caste, creed, and colour and they were the twelve gates of another world, whose beauty and splendour caused the physical realm to appear as candle in the sunlight. It is for this reason that astrology was regarded as a "divine science," through whose zodiacal symbolism, the spiritual evolution of the whole human race is interpreted.

The zodiac is comparable to a board in which the *nakshatras* form the string; Sun, the regulator, gives it vitality and sustenance, and Moon which harps on the strings of the zodiac while passing along the 27 *nakshatras*, produces vibratory currents in the creation, which affect the humanity at large. References to the Moon's phases may be seen in *Rig-veda*, (X, 85, 19) and *Yajur-veda* (XVIII, 40) cited *supra*.

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In its theological conception, Alan Leo takes zodiac as the "astral aura" of the 'Solar Logos in which earth may be taken as a little etheric particle circling round and round in this aura taking one year to complete the journey.' (*What Do We Mean by Astrology*, p. 54).

We have several references to the year and the division of time, to the additional month, to the twelve days and twelve nights. The *mantras* are quoted below in original.

Year and Division of Time

संवत्सरोऽसि परिवत्सरोसीदवत्सरोऽसीद्वत्सरोऽसि वत्सरोऽसि । उषसस्ते कल्पन्तामहोरात्रास्ते कल्पन्तामर्द्धमासास्ते कल्पन्तामृतवस्ते कल्पन्ताᳬसंवत्सरस्ते कल्पताम् । .....

(*Yajurveda* XXVII, 45)

"Thou art Samvatsara; thou art Parivatsara; thou art Idāvatsara; thou art Idvatsara; thou art Vatsara. Prosper thy Dawns ! Prosper thy Days-and-Nights ! Prosper thy Half—months, Months, seasons, and Years !"

Additional Month Mentioned

(अधिक मास)

अहोरात्रैर्विमितं त्रिंशदङ्गं त्रयोदशं मासं यो निर्मिमीते ॥

(*Atharv.* XIII, 3, 8)

"He who metes out the ***thirteenth*** month, constructed with days and nights, containing thirty members. This God, etc." (Griffith).

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Mention of Twelve Days and Twelve Nights

द्वादश वा एता रात्रीव्रत्या आहुः प्रजापतेः ।
तत्रोप ब्रह्म यो वेद तद्वा अनडुहो व्रतम् ॥

(*Atharva-veda* IV, 11, 11)

"Assigned are these twelve nights, they say, as holy to Prajāpati. Whoever knows their proper prayer, performs the service of God, (lit. ox-caldron), the upholder of the universe."

As to how astrological beliefs were evolved out of astronomical references in the Samhitā texts, Sir Monier Williams observes :

"Whatever may be the value of these verses in an astronomical point of view, it is clear that a superstitious belief began to show itself very early in India and that it grew and strengthened simultaneously with the growth of priestcraft and the elaboration of a complex ritual. The influence of the sun upon the atmosphere and soil made itself so manifest that it was natural to infer that similar influences belonged to the moon, planets and stars and the personification of all the most conspicuous luminaries which resulted from the supposed power inherent in their rays, of course, intensified the superstitious feeling of dependence upon their favourable aspects for the success not only of religious

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acts, but of all the affairs of life." (*Indian Wisdom*, p. 172).

Biblical References to the Twelve Signs

"The old Testament is full of allusions to the twelve zodiacal signs, as for instance, in the dream of Joseph, who saw eleven stars bowing to the twelfth, which was His star, the zodiac is referred to. The Roman Catholics have discovered in it a prophecy of Christ, who is that twelfth star, they say, and the others, the eleven apostles." (Madame Blavatsky, *Secret Doctrine*, I, 716).

Buddhistic Symbolism of the Zodiac

According to Furze Morrish, "from the Buddhist point of view which is evolutionary and spiritual with a *yoga*-basis, the zodiac symbolises the universal 'Wheel of Life and Death.' It depicts in the universal language of pictorial symbolism, the eternal process of Becoming, which constantly passes from various levels of Nescience to higher levels of 'Omniscience. Aries represents ignorance. Pisces represents universality, indicating the end of one stage of Becoming whence it leads to one or two directions, either *ananda*-bliss liberation into universality,.....or resubmergence in another cycle of manifested existence in Aries." (*Outline of Astro-psychology*, p. 251).

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According to A. E. Thierens, 'the twelve signs of the zodiac, represent the twelve *nidānas* of Buddhism.' *(Elements of Esoteric Astrology)*. *Nidānas* are the "spokes of the endless wheel." They are twelve in number and correspond remarkably with the twelve signs.

Aries-Taurus	the *Mahāpari-Nirvāṇa* plane
Gemini-Cancer	the *pari-Nirvāṇa* plane
Leo-Virgo	the *Nirvāṇa* plane
Libra-Scorpio	the *Buddhi* plane
Sagittarius-Capricorn	the *Mental* plane
Aquarius-Pisces	the *Astral* plane

Expressed in other symbols :—

Aries	represents	*Avidyā*
Taurus	,,	*Samskāra*
Gemini	,,	*Vijnāna*
Cancer	,,	*Nāmaroopa*
Leo	,,	*Shadāyatana*
Virgo	,,	*Sparśa*
Libra	,,	*Vedanā*
Sagittarius	,,	*Trishṇā*
Scorpio	,,	*Upādāna*
Capricorn	,,	*Bhāva*
Aquarius	,,	*Jāti*
Pisces	,,	*Jaramaraṇam*

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Why Twelve Signs – A Numerological Approach

Alan Leo in his book, *What Do We Mean by Astrology*, at pages 47-52 gives an explanation by taking the number twelve as a multiple of 3 and 4. The number 3 represents the three fundamental qualities in nature viz., mobility, inertia and rhythm or *rajas*, *tamas* and *sattva* and number 4 represents the four elements, fire, earth, air and water. If we place these elements in order upon the four points of a cross inscribed in a circle and make these four points the respective apices of four equilateral triangles,inscribed in the same circle we obtain our zodiacal circle of 360° divided into 12 signs of 30° each.

The three qualities pertain to the spiritual or divine triad and the four elements to the material or lower quaternary and,"it is from the interplay of these two groups of powers, the three qualities of life or spirit, on the one hand and the four elements of form or matter on the other, that the Zodiac of twelvs signs is built up." (*Ibid.*, p. 62).

The Keynote of the Zodiacal Personality

The distinctive characteristics of the twelve signs are beautifully indicated in the keynote given below :-

Adventurous Aries says : 'I am.'

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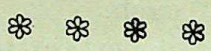
Thrifty	Taurus	says	: 'I have.'
Diversified	Gemini	says	: 'I think.'
Careful	Cancer	says	: 'I feel.'
Lordly	Leo	says	: 'I will.'
Vigilant	Virgo	says	: 'I analyse.'
Loving	Libra	says	: 'I balance.'
Strenuous	Scorpio	says	: 'I see.'
Sagacious	Sagittarius	says	: 'I strike.'
Cautious	Capricorn	says	: 'I use.'
Altruistic	Aquarius	says	: 'I serve.'
Poetic	Pisces	says	: 'I realize.'



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CHAPTER IV

THE VEDIC NAKSHATRAS AND THE LUNI-SOLAR CONCEPT OF TIME

The Nakshatras

यानि नक्षत्राणि दिव्यन्तरिक्षे अप्सु भूमौ यानि नगेषु दिक्षु ।
प्रकल्पयंश्चन्द्रमा यान्येति सर्वाणि ममैतानि शिवानि सन्तु ॥
(*Atharv.* XIX, 8, 1)

अष्टाविंशानि शिवानि शग्मानि सह योगं भजन्तु मे ।
योगं प्र पद्ये क्षेमं च क्षेमं प्र पद्ये योगं च नमोऽहोरात्राभ्यामस्तु ॥
(*Atharv.* XIX, 8, 2)

(1) 'Benign to me be all those Lunar Mansions to which the Moon as she moves on, doth honour – all that are in the sky, the air, the waters, on earth, on mountains, in the heavenly regions.'

(2) 'Propitious, mighty, let the eight and twenty together deal me out my share of profit—profit and wealth be mine, and wealth and profit ! To Day and Night be adoration rendered !'

Names of Nakshatras as Mentioned in the Vedas

सुहवमग्ने कृत्तिका रोहिणी चास्तु भद्रं मृगशिरः शमार्द्रा ।
पुनर्वसू सूनृता चारु पुष्यो भानुराश्लेषा अयनं मघा मे ॥
(*Atharv.* XIX, 7, 2)

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पुण्यं पूर्वाफल्गुन्यौ चात्र हस्तश्चित्रा शिवा स्वाति सुखो मे अस्तु ।
राधे विशाखे सुहवानुराधा ज्येष्ठा सुनक्षत्रमरिष्ट मूलम् ॥
(*Atharv.* XIX, 7, 3)

अन्नं पूर्वा रासतां मे अषाढा ऊर्जं देव्युत्तरा आ वहन्तु ।
अभिजिन्मे रासतां पुण्यमेव श्रवणः श्रविष्ठाः कुर्वतां सुपुष्टिम् ॥
(*Atharv.* XIX, 7, 4)

आ मे महच्छतभिषग् वरीय आ मे द्वया प्रोष्ठपदा सुशर्म ।
आ रेवती चाश्वयुजौ भगं म आ मे रयिं भरण्य आ वहन्तु ॥
(*Atharv.* XIX, 7, 5)

'The brilliant lights shining in heaven together, which through the world glide on with rapid motion. And days and firmament with songs, I worship, seeking the twenty-eight fold for its favour.' (Griffith)

1. Krittikā, Rohiṇī, be swift to hear me ! Let Mrigaśiras bless me, help me Ārdrā ! Punarvasu and Sunritā, fair Pushya, the Sun, Āśleshas, Maghā, lead me onward.

2. May bliss be Svāti and benign Chitrā, Purvā Phalguṇī and Hasta-Rādhās, Viśākhas, gracious Anurādhā, Jyeshthā and happy starred uninjured Mula.

3. Food shall the Purvāshādās grant me ; let those that follow bring me strength and vigour. With virtuous merit, Abhijit endow me ! Śravaṇa and Śravishthās make me prosper.

4. Śatabhishak afford me ample freedom

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and both the Proshthapadas guard me safely. Revatī and the Aśvayujas bring me luck and the Bharaṇīs abundant riches !

An asterism (*nakshatra*) as a division of the zodiac, brings out a relation between the sun and the moon and has its basis in the luni-solar concept of time.

Time taken by the Sun to complete one revolution round the zodiac, is 365.25 days. Time taken by Moon to complete one revolution round the zodiac is 27.32 days. Therefore, $\frac{\text{Time of Sun}}{\text{Time of Moon}} = \frac{365.25}{27.32} = 13\frac{1}{3} = 13^{\circ}\ 20$. That is to say, while the Sun completes one revolution, the Moon completes $13\frac{1}{3}$ revolutions approximately. Taking such an arc of $13^{\circ}20'$ the whole zodiac is divided into 27 divisions which are called *nakshatras* or Lunar Mansions.

The asterism occupied by the moon is said to rule the day. Each of these asterisms is divided into four parts called *pada*, and as there are 30° in each sign and $13^{\circ}\ 20'$ in each asterism it follows that a sign contains just $2\frac{1}{4}$ asterisms i. e., two whole asterisms and one part. In India the asterism in which the moon is situated is called the *janma-nakshatra*. Every Hindu knows his *nakshatra* and on the basis of that, birth names are selected.

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1. Aśvini. Latin: *Arietus*. It is the first asterism in an arc of the zodiac beginning from 0° Aries to 13° 20′ Aries. It resembles three stars like a horse's face. It is the symbol of transport. Its deities are *Aśvini Kumāras*. People born under Aśvini asterism accomplish wonderful deeds, are swift and are skilled in the art of healing. They are good physicians, because Aśvini Kumāras are the physicians of the gods.

2. Bharaṇī. Latin : *Arietisa Mus*. It is the second asterism in an arc extending from 13° 20′ Aries to 26° 40′ Aries. It has for its symbol the orific of the womb and is a cluster of 3 stars. Its guiding deity is the *Yama-rāja*. Act of checking, restraint, and suppression are implied in this, also war, battle and contest.

People born under the influence of this asterism are fighters,men of strong will power and forbearance.

3. Krittikā. Latin : *Tauri Alcyoni*. It is the third asterism in an arc extending from longitude 26° 40′ Aries to 10° Taurus. It resembles six stars like a razor. Its deity is fire, *Agni*. People born under the influence of this asterism are bright and hold commanding position in life.

4. Rohiṇī. Latin : *Tauri Aldeboran*. It is the

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fourth asterism in an arc extending from 10° Taurus to 23° 20′. It resembles six stars like a chariot. Its deity is *Brahmā*. The ideas of rising, ascending, elevation, promotion and growth are all indicated by this asterism.

People born under its influence are truthful, good conversationalists, steady of mind, charitable and liberal.

5. Mrigaṡira. Latin : *Orionis*. It is the fifth asterism in an arc extending form 23° 20′ Taurus to 6° 40′ Gemini. It resembles three stars like the head of a deer. Its governing deity is Moon. People born under this constellation are of persevering nature, good talkers, wealthy, have long easy life but are impulsive and suffer from inferiority complex. They are fond of travels and good bath.

6. Ārdrā. Latin : *Orionis*. It is the sixth asterism in an arc extending from 6° 40′ Gemini to 20° Gemini. It resembles one star like the drop of a tear, the word Ārdrā itself having been derived from *Vard*, to flow.

Its guiding deity is *Ṡiva*. People born under its influence are weak, selfish, proud and easily angered.

7. Punar-Vasu. Latin : *Gemini Pollux*. It is the seventh asterism in an arc extending from 20° Gemini to 3° 20′ Cancer. It resembles three

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stars like a bow. It is the star of renewal. Its governing deity is *Aditi*. It indicates riches, goods, property, restoration or renewal of wealth and people born under this asterism are well behaved and tactful, happy and progressive.

8. Pushya. Latin : *Cancri*. It is the eighth asterism in an arc extending from 3° 20′ Cancer to 16° 40′ Cancer. It resembles three stars like a flower.

Its governing deity is *Angiras*. The ideas represented by this asterism are nourishment, blossoming of a flower, increase, gain, display enjoyment and possession. People born under its influence are lawyers, dutiful sons, good natured, learned, wealthy and popular.

9. Āślesha. Latin : *Hydrae*. It is the ninth asterism in an arc extendiug from 16° 40′ Cancer to 30° Cancer. It resembles six stars like a coiled snake. It ist he clinging star and ideas represented by it are adherence, embracing—also creeping like a snake, poison, torment.

People born under its influence are strong, joyful, learned, ungrateful, deceitful and multi-tongued.

10. Magha. Latin : *Leonis Regulas*. It is the tenth asterism in an arc extending from 0° Leo to 13°20′ Leo. It resembles five stars

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like a palanquin. Its deity is the *Pitar*. It shows light, lustre, brilliance. People born under its influence are wealthy, god-fearing, mighty, enthusiastic, and love flowers and fragrance and have many servants.

11. Purvā Phālgunī. Latin : *Leonis*. It is the eleventh asterism in an arc extending from 13° 20′ Leo to 26° 40′ Leo. It resembles four stars like the legs of a cot. It is an asterism of luck and is a dispenser of good fortune, welfare, happiness, love and affection.

People born under its influence are charitable, sweet-tongued, far-seeing, apt to be unsteady, successful merchants.

12. Uttarā Phālgunī. Latin : *Leonis*. It is the twelfth asterism in an arc extending from 20° 40′ Leo to 10° Virgo. It resembles four stars like a bed.

Its governing deity is *Aryama*. It forms a pair with the eleventh asterism Purvā-Phālgunī It is indicative of patronage, kindness, favour and relief.

People born under its influence are intellectual, truthful, short-tempered, healthy-minded but have bad appetites.

13. Hast. Latin : *Corvi*. It is the thirteenth asterism in an arc extending from 10° Virgo to 23° 20′ Virgo. It resembles five stars

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like a hand.

Its deity is *Ravi*, the Sun. It represents hand-writing, handicrafts, grasp, control and authority. People born under its influence are learned, courageous, enthusiastic, grateful, wealthy towards the later part of life.

14. Chitra. Latin : *Virginis Spica*. It is the fourteenth asterism in an arc extending from 23° 20′ Virgo to 6° 40′ Libra. It resembles one star like a very bright jewel.

Its deity is *Tvashtā*. People born under its influence are good natured, fond of ornaments, deliberate and have lovely eyes.

15. Svāti (self-going). Latin : *Bootis, Arcturus*. It is the fifteenth asterism in an arc extending from 6° 40′ Libra to 20° Libra. It resembles one star like a young shoot or sprout agitated by the wind. Some take it to resemble a sapphire. It indicates wealth and riches coming and going out by themselves.

Its governing deity is *Vāyu*, the wind. People born under its influence are well-behaved, charitable, god fearing, scholarly, dutiful to parents and have self-mastery.

16. Viśākhā. Latin : *Librae*. It is the sixteenth asterism in an arc extending from 20° Libra to 3° 20′ Scorpio. It resembles three stars like a potter's wheel.

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Its deity is *Indragni*. It indicates accomplishment of one's wishes. People born under the influence of this asterism are careful in speech and are God-fearing.

17. Anurādhā. Latin : *Scorpionis*. It is the star calling to activity. It is the seventeenth asterism in an arc extending from 3° 20′ Scorpio to 16° 40′ Scorpio.

It resembles three stars like an umbrella. Its deity is *Mitra*. The asterism implies a co-worker, an ally, a friend and a helper. People born under its influence are wealthy, honoured by the great and are fond of travel in foreign soil.

18. Jyeshthā. Latin : *Aritares*. As the name implies, it is an asterism signifying the 'chief one.' Most excellent, pre-eminent, best, greatest are the qualities represented by this asterism.

It is the eighteenth asterism in an arc extending from 16° 40′ Scorpio to 30° Scorpio. It resembles three stars like a circular ornament, meant for protection against evils. Its deity is *Indra*, the chief of gods.

19. Mūla. Latin: *Scorpionis*. It is the nineteenth asterism in an arc extending from 0° Sagittarius to 13° 20′ Sagittarius. It resembles 6 stars like the tied bunch of roots, the literary

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meaning of Mula, also being 'root.'

Its deity is *Nirriti*, and it is indicative of basis, foundation, commencement, origin, cause, source, the original text, as opposed to commentary—all implied in the word Mula, the root of all things.

20. Purva-Āshādā. Latin : *Sagittarii.* It is the twentieth asterism in an arc extending from 13° 20′ Sagittarius to 26° 40′ Sagittarius.

It resembles four stars like a winnowing basket or fan.

The literary meaning of the word Purvā-Āshāda is 'the invincible one' and as the meaning implies, it indicates victory and conquest. Its deity is *Āpa*, water. People born under its influence are far sighted, truthful, fond of travel and bathing.

21. Uttara-Āshādā. Latin : *Sagittarii.* It is the twenty-first asterism with an arc extending from 26° 40′ Sagittarius to 10° Capricorn, and it forms a pair with the previous asterism.

It consists of four stars resembling an elephant's tusk. Its deity is *Vishvedevas.* People born under the iufluence of this asterism are strong, muscular, graceful, popular, humble and have great discriminative faculty.

22. Śravaṇa. Latin : *Aquilae.* It is the twenty

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second asterism in an arc extending from 10° Capricorn to 23° 20′ Capricorn.

It resembles 3 stars like the three foot-prints of Vishṇu, who is the governing deity of this asterism.

It is the star of learning, the literary meaning of *Śravaṇa*, is 'to listen'. The asterism indicates one who has learnt,or studied,a scholar, one endowed with intellectual attainments.

23. Dhanishthā. Latin : *Delphini* This asterism forms a pair with the 22nd asterism Śravaṇa and is the star of symphony. It extends from 23° 20′ Capricorn to 6° 40′ Aquarius.

It represents four stars like a musical drum. Its deity is *Vasu*, denoting wealth, riches, jewels, gems, treasures and everything highly valuable. People born under its influence are fearless, independent, noble, valiant and esteemed by the elderly.

24. Śata-Bhishak Latin : *Aquarii.* It is the twenty-fourth asterism in an arc extending from 6° 40′ Aquarius to 20° Aquarius.

It resembles hundred stars like a circle enclosing a space. It gives an idea of covering, enclosing. Its deity is *Varuṇa*.

People born under its influence have good legal brains, are uncompromising, truthful, learned and courageous.

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25-26. Purvā and Uttarā Bhādrapadā. Latin : *Pegasi.* These two asterisms form a pair and their extent is from 20° Aquarius to 3° 20′ Pisces (for Purvā) and up to 16° 40′ Pisces (for Uttarā Bhādrapadā).

They resemble four stars like the legs of a cot. People born under the influence of these asterisms are charitable, talkative, prolific in argument, and have great aptitude for learning. 27. Revatī. Latin : *Piscium.* It is the twenty seventh asterism in an arc extending from 16° 40′ Pisces to 30° Pisces.

It is the star known as the keeper of flocks. Its deity is *Pushā* and it resembles 3 stars like a drum for beating time. It is indicative of development, unfoldment and display which are the attributes of god Pushā.

People born under the infiuence of this asterism are extremely popular, scorn others' money, and are perfectly bodied.

Note :—Only twenty-seven asterisms are popularly recognized in India,the 28th asterism, Abhijit is not noticed in astrological reckonings on account of its peculiar motion It is sometimes used by astrologers for the purpose of some branches of horary astrology (the Praṣna).

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Relationship of Signs and Nakshatras

As there are thirty degrees in each sign and 13° 20′ in each Nakshatra, it follows that a sign contains two whole Nakshatrās and one part. We give the following table to indicate how signs are made up.

I.	मेष Aries	=	अश्विनी + भरणी + कृत्तिका 4 padas 4 1		
II.	वृष Taurus	=	कृत्तिका + रोहिणी + मृगशिर 3 4 2		
III.	मिथुन Gemini	=	मृगशिर + आर्द्रा + पुनर्वसु 2 4 3		
IV.	कर्क Cancer	=	पुनर्वसु + पुष्य + आश्लेषा 1 2 4		
V.	सिंह Leo	=	मघा + पूर्वाफाल्गुनी + उत्तराफाल्गुनी 4 4 1		
VI.	कन्या Virgo	=	उत्तराफाल्गुनी + हस्त + चित्रा 3 4 2		
VII.	तुला Libra	=	चित्रा + स्वाती + विशाखा 2 4 3		
VIII.	वृश्चिक Scorpio	=	विशाखा + अनुराधा + ज्येष्टा 1 4 4		
IX.	धनु Sagittarius	=	मूल + पूर्वाषाढ़ा + उत्तराषाढ़ा 4 4 1		
X.	मकर Capricorn	=	उत्तराषाढ़ा + श्रवण + धनिष्ठा 3 4 2		
XI.	कुम्भ Aquarius	=	धनिष्ठा + शतभिषा + पूर्वाभाद्रपदा 2 4 3		
XII.	मीन Pisces	=	पूर्वाभाद्रपदा + उत्तराभाद्रपदा + रेवती 1 4 4		

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CHAPTER V

COPERNICAN THEORY AND THE VEDIC VIEW

In *Yajurveda*, Chapter III, we have a verse to show that this earth moves round the sun.

आयं गौः पृश्निरक्रमीदसदन् मातरं पुरः । पितरं च प्रयन्त्स्वः ॥

(*Yajurveda*, III, 6)

"The earth with all its waters revolves round the sun." (Dayānanda-*Satyārtha Prakāsha*,Chapter VIII,p. 254, translated by Dr. C.L. Bharadwaja). According to another translator : "the Earth revolves in the space, it revolves with its mother, Water, in its orbit. It moves round its father, the Sun." (*The Yajurveda*, p. 37, translated by Devi Chand, M.A.).

"Water is the mother of Earth as Earth is produced by the mixture of the particles of water with its own particles and remains pregnant with water. Sun is the father of the Earth as from the Sun, it derives all light and sustenance." (*Ibid.* foot note 6).

According to Griffith,

पृश्निः =Spotted Bull = The Sun
मातरं =The Mother = The Earth.
पितरं =The Father = The Sky.

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(*The Texts of the White Yajurveda*, translation with a popular commentary, p. 21).

Long before Copernicus could say anything about his helio-centric system of astronomy, in his famous work, "*The Revolutions of the Heavenly Bodies*," the truth about the revolution of the earth round the sun, was known to the Vedic seers.

When this theory was published in Europe, there was a great hue and cry. Martin Luther said, "People gave ear to an upstart astronomer who tried to show, the earth revolves, not the sun and the moon. This fool wishes to reverse the entire science of astronomy but moral scriptures tell us, that Joshua commanded the sun to stand and not the earth."

Calvin was equally loud in his denunciation of Copernicus, and Lactantius, another contemporary theologian wrote, "Is there any one so senseless as to believe that the crops and the trees on the other side of the earth hang downwards and that men have their feet lighter than their heads ?"

But the Indian Seers were fully aware of the earth's revolution and its astronomical implication.

The Aitareya Brāhmaṇa clearly held the view,that the sun never sets nor rises and that

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the apparent motions of the sun are really due to tne rotation of the earth.

The original text of the Aitareya Brāhmaṇa is given below :—

स वा एष न कदाचनास्तमेति नोदेति तं
यदस्तमेतीति मन्यन्तेऽह्न एव
तदन्तमित्वाथात्मानं विपर्यस्यते
रात्रिमेवावस्तात् कुरुतेऽहः परस्तात् ।
अथ यदेनं प्रातरुदेतीति मन्यन्ते रात्रेरेव
तदन्तमित्वाऽथात्मानं विपर्यस्यते ।
अहरेवावस्तात् कुरुते रात्रिं परस्तात्
स वा एष न कदाचन निम्रोचति न ह वै कदाचन निम्रोचति ॥

(*Aitreya Brāhmaṇa*, III. 4, 6)

Ārya Bhatta, the great Indian Astronomer of the 5th century A.D. explains the same thing when he says in his Ārya Siddhānta :

भवं जरः स्थिरो भूरे वा वृत्यावृत्य
प्रतिदैवसिकौ उदयास्तमयौ संपादयति ग्रहनक्षत्राणाम् ॥

that is, the stars are fixed but it is earth which causes the daily rising and setting of the planets and Nakshatras, by its motion round the sun.

While concluding his observations on the Aitreya Brāhmaṇa,Sir Monier Williams remarks, "We may close the subject of the Brāhmaṇas by paying a tribute of respect to the acuteness of the Hindu mind, which seems to have made some shrewd astronomical guesses

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more than two thousand years before the birth of Copernicus." (*Indian Wisdom*, p. 37).

Copernican theory and Astrological Calculations

The Copernican theory has given a ground for critics to say something against the basis of astrological calculations which rest solely on the geocentric system. But this criticism loses force, when we remember, that the astrologer is concerned with the influence of the sun and the planets as shown by their position with respect to the earth, in other words, the mutual position of the Sun, Moon and Planets in relation to the Earth.

As Alan Leo observes,"It is clear,therefore, that so far as that relativity is concerned, it is immaterial which of the two factors constituting it,is taken as the starting point in calculating. It is abundantly clear,therefore, that since the astrologer is concerned with this relativity of position, his conclusions will not be affected in any way by the fact of the Earth moving round the Sun, instead of the Sun round the Earth."(*What Do We Mean by Astrology*,p.63).

According to Kamal Ghosh, "Geocentric conception of the planetary motion that prevails in India is not the outcome of ignorance,as some western scholars suppose, but it was resorted to, as it helped to reckon time with its

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bearing upon terrestrial events. It is a mere conversion of values." (*The Cosmos and Human Destiny*, p. 69).

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